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# **SITE-SPECIFIC ENVIRONMENTAL COMPLIANCE PLAN**

**for DUSHETISKHEVI Flood Protection**  
Implemented under: Municipal Infrastructure and  
IDP Housing Rehabilitation Project, Component 1  
DCN: 2010-GEO-033

Prepared by: TetraTech

**SITE-SPECIFIC ENVIRONMENTAL COMPLIANCE PLAN**  
**ONI STREETS REHABILITATION SITE**

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**A. PROJECT AND SITE DATA:**

<b>Project Name:</b>	<b>USAID/Caucasus – Municipal Infrastructure and IDP Housing Rehabilitation Project</b>
<b>Country:</b>	<b>Georgia</b>
<b>DCN of Triggering IEE:</b>	<b>2010-GEO-033</b>
<b>Component Name:</b>	<b>Component 1</b>
<b>Type of Activity:</b>	<b>Rehabilitation of Municipal Infrastructure</b>
<b>Site Name:</b>	<b>DUSHETISKHEVI Flood Protection</b>
<b>Name of Reviewer</b>	<b>James Gallup, Team Leader and Environmental Specialist Mamuka Gvilava, Environmental Specialist</b>
<b>Date of Review:</b>	<b>30 September 2011</b>

**B. SITE DESCRIPTION:**

USAID is providing assistance to the Government of Georgia (GoG) under the Georgia Municipal Infrastructure and IDP Housing Rehabilitation Project (GMIP). The project implementation period is 2011-2013. GMIP includes three components, Component 1, Municipal Infrastructure, Component 2, Rehabilitation of Irrigation Infrastructure and Component 3, IDP (Internally Displaced Persons) Durable Housing. The Municipal Development Fund (MDF) will be responsible for procurement of the works, goods and services required.

Based on results of the consultations with the population and the local council of Dusheti Municipality the GoG and USAID selected flood protection works for Dushetiskhevi river gorge sub-project, with hopes that rehabilitated riverbed and related infrastructure will contribute to better protection of local population and infrastructure from flood hazards.

This Site-Specific Environmental Compliance Plan (SS ECP) is prepared for the GMIP municipal component 1, in particular, the improvement of river bank protection and increased flow capacity of the Dushetiskhevi river through the town of Dusheti under the sub-project entitled Dushetiskhevi Flood Protection.

**1. Location and problem**

Dusheti municipality with its administrative center Dusheti settlement is located in the East of Georgia and belongs to Mtskheta-Mtianeti Region. It is bordered by Kazbegi Municipality and Russian Federation territories on the North, Tianeti Municipality – on the East, Akhlagori Municipality – on the West and Mtskheta Municipality – on the South. The distance between the administrative center and capital Tbilisi is 54 km. The region is characterized by mountainous relief. Geographic coordinates of Dusheti settlement are N 42°05'00" E 44°42'00" and elevation is 900 m ASL.

The Dushetiskhevi River Gorge borders the city of Dusheti on the west, gets sources from the mountains and joins River Aragvi. The total length of this stream is approximately 13 km. The water flows from the slopes of the mountains and with mobilized sediments contribute into water and material discharges through the Dushetiskhevi Gorge.

During the heavy rain events the raised water frequently floods the adjacent territories putting at risk the lives and properties of local inhabitants. The length of the concerned section under project consideration is 1500 m. One bridge and two culvert bridges are located at the project section. One culvert bridge is located along the Rustaveli Street, whilst the second culvert bridge is located along the Ioseliani Street.

The small cross-sections of the culvert bridges sharply reduce the real cross-sections of the bed of the Dushetiskhevi Gorge, which results in the development of bed erosion processes in the downstream side of the riverbed. On the other hand, the large quantity of the water cannot be passed through the small cross-sections of the culvert bridges, resulting in flooding of the adjacent territories.

The second culvert bridge consists of two sections with a dividing wall in the middle so that sized debris can not pass through the opening during the water level rise.

At the end of culvert bridges the walls holding the fills are damaged and the embankments and foundation of the culvert bridges are being outwashed, that puts at risk the road safety and lives of the population.

The bed of the Dushetiskhevi is filled with boulders of various sizes, as well as stones, demolished concrete and even macadam debris.

Besides, because of the non-existence of bank revetment structures the banks of the Gorge are approaching the houses and other properties of the local inhabitants.

Field investigations and meetings with population revealed the following situation at the site:

- During rains the water level rises, resulting in flooding of adjacent agricultural land plots of local population and killing their poultry and cattle. The flood in 2005 resulted even in human casualties.
- The abrasive processes are being developed at the rehabilitation site. Implementation of rehabilitation works is necessary to avoid negative geological processes. The left bank of the Gorge bed is strengthened by means of supporting wall, whilst the unprotected right bank is being outwashed.
- Two existing bridges reduce the effective cross section of the riverbed and as a result solid materials carried by river can not pass through it. Consequently erosion processes are being developing in the lower-side of the Gorge and the banks are being outwashed as well. On the other hand, the large quantity of water cannot pass through these bridges during the water rise, flooding the nearby territory. The construction of new bridges with appropriate cross sections and discharge capacity is necessary.
- Unfortunately nearby territory of the gorge is settled by the population and their life is at risk. During the rain events the population is highly disturbed as they are living under the constant threat of flooding.

Consequently, the following are the risks and concerns at the site:

- The flood during the rain devastates the property of local inhabitants and endangers human lives.
- The existing condition of culver bridges is precarious. The outwashing process may cause the collapse that will block the road and the bed of the Gorge.
- Eroding banks of the Dushetiskhevi are threatening houses and other properties of local inhabitants.

## **2. Beneficiaries**

Dusheti town, an administrative center of Dusheti Municipality (population about 33,000 according to census of 2002), and belonging to Mtskheta-Mtianeti Region, is the main beneficiary of the subproject. 7000 population living in local settlements (Kobiaantkari, Sulikiantkari, Shalikiantkari and Mtvareliantkari), within the project influence area around Dusheti, will benefit from the project, while estimated 300 inhabitants living in immediate vicinity to the Dushetiskhevi site will be direct beneficiaries of the project.

## **3. Benefits**

Due to lack of detailed data it is not possible to quantify some very important benefits of the project, but qualitatively these benefits include the improvement of health and safety conditions for target population, better protection of their lives, releasing them from constant threat and expectation of flooding at night times in particular, etc. The benefits related to improvement of transportation in Dusheti due to reconstruction of the two bridges in the town can be quantified, factoring in the savings in travel time, savings in vehicle operating costs and reduction of maintenance costs.

With rehabilitation project the bandwidth capacity of the bed will be restored and the nearby territories will not be flooded during the water level rise. As a result the lives of people will not be endangered. Benefits of the project can be highlighted through analysis of non-acceptability of the 'without the project' scenario, as this option would be resulting in the following to continue:

- Every water level rise, that occurs several times during the year, will continue to endanger the population and their property;
- The culvert bridges would be further damaged and may result in their collapse, cutting off the roads leading to local villages, and further enhancing the flood threats and impacts.

Resettlement of population cannot solve all problems as the bandwidth capacity of the riverbed must be restored, but the alternative of resettlement of the inhabitants living nearby the Dushetiskhevi riverbed, with relevant compensation, should be considered in addition to proposed technical solutions. This could be combined with improved land use regulations, restricting any further developments in the flood impact areas, so that Dusheti and its inhabitants benefit from the project through long-term and low cost solutions of planning and management, rather than measures of only investment nature.

Soft engineering solutions for bank protection could be considered as an alternative as well, such as widening the riverbed cross-section, placement of rip-raps, gabions or other flexible structures, with much less visual impact, with ease of maintenance and repairs, and free from collapse characterizing hard engineering structures such as concrete walls.

## **4. Description of Site Activities**

The objectives of the rehabilitation works in Dushetiskhevi riverbed are the following:

1. The riverbed of Dushetiskhevi must pass the flow rates of water and sediment materials designed for high water conditions.
2. Banks revetments and other measures should protect the properties and lands from flooding.

Planned site activities respectively are:

1. To ensure the bandwidth capacity of the riverbed
  - Dismantling of #1 and #2 culvert bridges and arrangement of new bridges in replacement, which will pass calculated flows of water and materials.
  - Cleaning the bed from stones and macadam waste, boulders and demolished structures
2. Bank Revetment Works

- Arrangement of retaining walls or other more flexible bank protection structures at dangerous places where the banks of the bed are outwashed.

The project envisages arrangement of two bridges with concrete reinforcement cast in place piers and metallic span (concrete reinforcement beam). The proposed distance between the piers is 15 m, which can be changed as a result of hydrological survey. The total proposed width of the bridge is 8m. The width of the carriageway is proposed to be 6 m, with the width of sidewalks 1+1=2 m. The total length of the bridge including the piers is estimated to 25 m. Sketch of the bridge is provided on Drawing 1.

The bed is proposed to be cleaned within the area 1300-1500 m in length and 1 m in depth. Works is estimated to include relocation of some 26,000 m<sup>3</sup> materials in the bed, as well as loading of the stones and macadam waste in the trippers and disposing of to a distance of 3 km away.

The height of concrete reinforcement cast in place walls will be 5 m. The total length of the walls will approximately be 500 m. (note above discussion on alternatives soft engineering solutions and management options through resettlement and compensation).

The following range of equipment will be used in the construction: excavator 0.65 m<sup>3</sup> (1), excavator 1,0 m<sup>3</sup> (1), trippers (6), concrete trunk (6), compact compressor (2), hydrohammer excavator (1), crane 40 t (1), crane 10 t (1), bulldozer (2), roller (1).

## 5. Site-specific Timeframe and Schedule

Design & bidding documentation preparation is estimated to last for 3 months upon initiation (plus 1 month for design contract tendering and signing). Works bidding and contracting will take at least 3 months. Works could be initiated as early as summer of 2012. By the time of bidding for works EMMPs should be finalized. By the time of contractor mobilization all permits & clearances should be in place.

The following are the components and duration of works, as proposed in the feasibility study:

Time schedule for rehabilitation works	Unit	Qty	Month 1				Month 2				Month 3				Month 4				Month 5				Month 6				Month 7			
			01	02	03	04	01	02	03	04	01	02	03	04	01	02	03	04	01	02	03	04	01	02	03	04	01	02	03	04
Mobilization	Month	0.5	■	■																										
Dismantle & construct bridge 1	Unit	1			■	■	■	■	■	■	■	■																		
Dismantle & construct bridge 2	Unit	1											■	■	■	■	■	■	■											
Cleaning riverbed	Meter	1500			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Arranging retainment structures	Meter	500			■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Handover and demobilization	Month	0.5																										■	■	

The rehabilitation works must not be implemented during the rainy season when the possibility of flood is high. Works could be implemented in the periods of low waters in 2012-2013 season. Seasonal time-window due to climatic, hydrological and other conditions for this site is approximately mid July to early spring of the next year. The rehabilitation work should therefore be planned starting from July 2012.

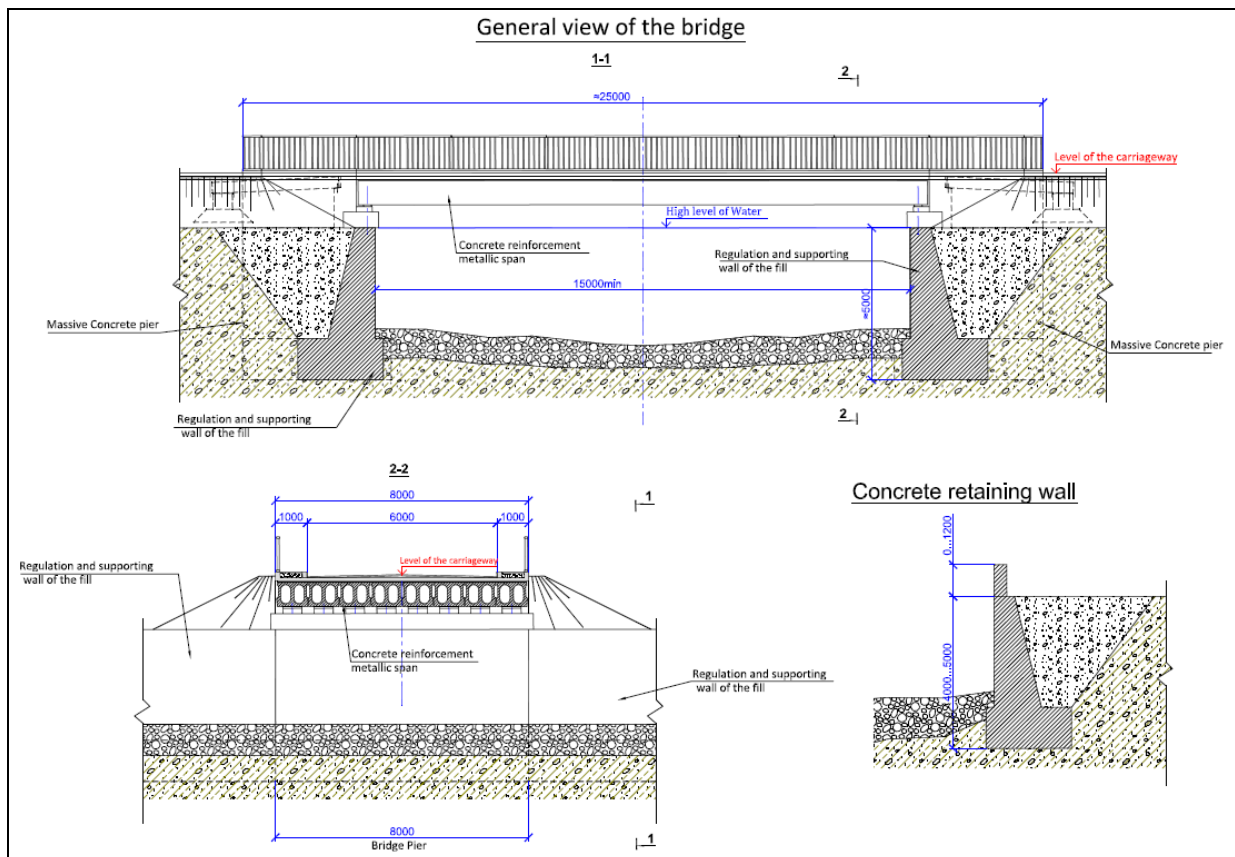
Estimated cost of construction is USD 1,595,000 (including design and supervision).

Operation and maintenance period of completed works is expected to be 100 years (till 2110).

## 6. Site Maps and Drawings

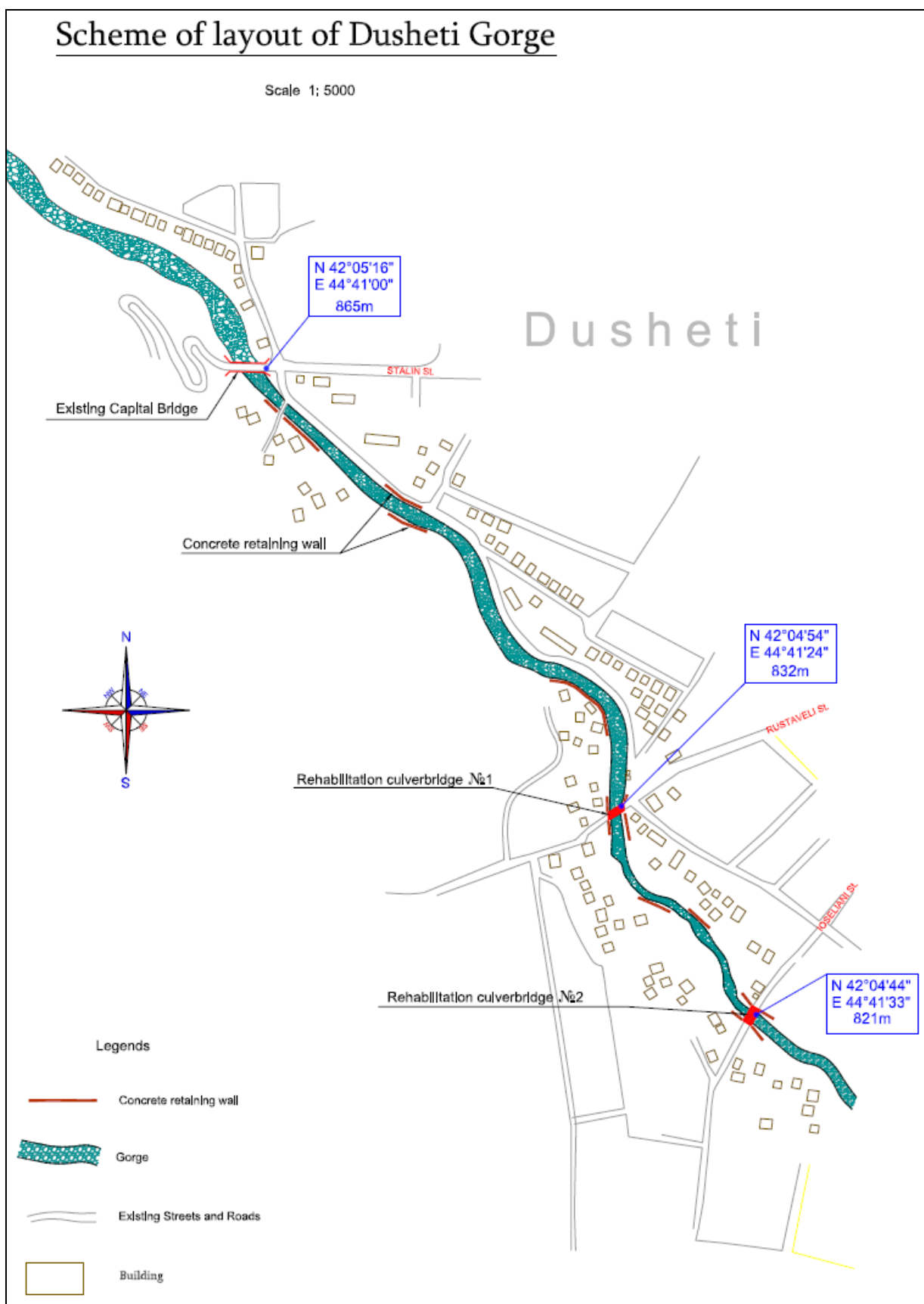


**Map 1.** Location of Dushetiskhevi site (source: Kavgioprotransi-MG Ltd Feasibility Study, July 2011)



**Drawing 1.** Proposed layout for bridge design





**Map 2.** Dushetiskhevi flood protection site layout (source: Kavgioprotransi-MG Ltd Feasibility Study, July 2011)

## **7. Photos of Site**

### **DUSHETI Gorge**



**Photo 1.** Existing capital bridge with one support column in the riverbed.



**Photo 2.** Non-capital bridge. Illegal waste dumping into the riverbed is evident along the entire site.



**Photos 3 and 4.** River flow is squeezed between private structures and local road along the riverbed.



**Photos 5 & 6.** Typical panoramas of right (up) and left (down) banks in the middle section of the site.







**Photo 7.** Entrance portal of culvert bridge №1



**Photo 8.** Exit portal of culvert bridge №1.  
Household waste is again evident in the riverbed.



**Photo 9.** Entrance portal of two-boxed culvert bridge №2, leading to vil. Kobiaantkari



**Photo 10.** Exit portal of two-boxed culvert bridge №2, leading to vil. Kobiaantkari



**Photos 11 and 12.** Culvert bridge №2 during lower waters (August, 2011). **Water and material passage capacity should be increased and elevation step in the riverbed eliminated through adequate design.**

## C. SITE-SPECIFIC BASELINE ENVIRONMENTAL CONDITIONS:

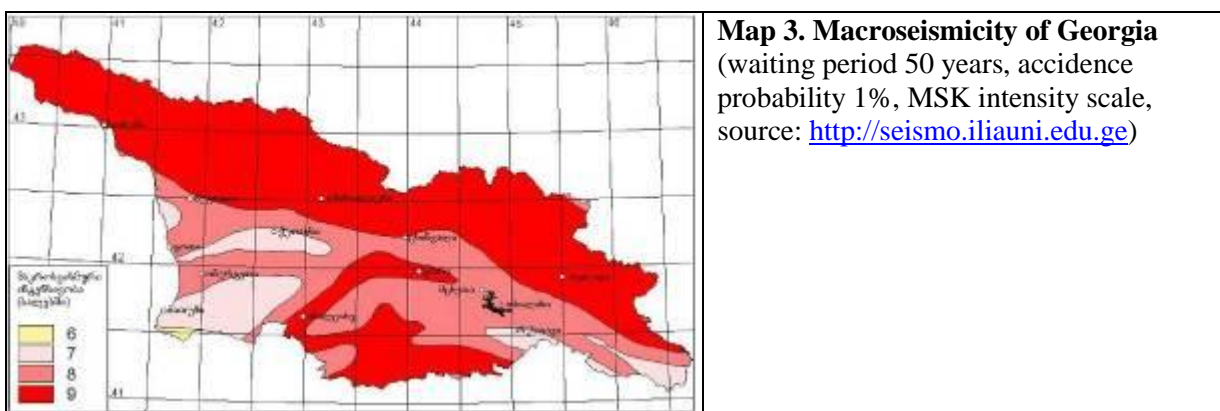
### 1. Geography / Geology

**Geography.** The wider region is characterized by mountainous relief. Its uplands are located in the alpine and sub-alpine zone. Accordingly the cold season continues during 8 months. The annual average temperature is 11°C, whilst the maximum average temperature is 39°C and minimum temperature -30°C.

**Geology and Geomorphology.** Alluvial meadow carbonate and brown carbonate soils are spread across the Dusheti plain. Geologically it belongs to fold system of the Lesser Caucasus Mountain and is characterized by plain relief constructed by Quaternary Age conglomerates, pebbles, sand and loamy sand. The southern part is constructed by paleogenic limestones and loam, whilst the northern part is constructed by neogenic loam and limestones.

Geomorphologically the territory represents the plain area where wide terrace plains are spread. The territory is characterized by accumulative as well as denudative landslides. There are no important geodynamical processes at the rehabilitation site area. The bed of the Dushetiskhevi tributary is geologically built of quaternary age alluvial-proluvial deposits (apQ<sub>IV</sub>) which are lithologically represented by rubbles, pebbles, gravel and grit, cemented with loam. The adjacent slopes of the site geologically are built of Miocene age (N<sub>1</sub><sup>2</sup>) poorly cemented conglomerates.

**Seismicity.** The rehabilitation site is situated in high 8-magnitude seismicity (MSK 64 scale) zone, as can be seen from the Map 3 below, depicting the macroseismic zoning of Georgia.



### 2. Natural and Cultural Resources

**Protected Areas & Cultural Heritage.** The feasibility and scoping study reports that rehabilitation works are not carried out within or near the protected areas. There are no natural and archeological monuments within the site area. Considering the fact that the project envisages rehabilitation of existing system, the chance to discover archeological monuments or a risk of impacting archaeological monuments is very low.

**Soils.** There are various types of soils spread in this region: weak gray forest and brown earth soils are found on the slopes of the mountains, whilst the crowns of the mountains are covered by greensward and greensward-peaty mountain-meadow soils. Transitional black soils are spread in the plains.

**Flora.** With regard to flora in the rehabilitation site area, cultural plants are spread across the plain areas, while among natural plants meadow grasses are most common. Trees and shrubs are present in spars density, mostly along the right bank of the gorge.

**Terrestrial fauna.** Due to populated setting, wild fauna is not expected at the rehabilitation site area.

**Aquatic fauna.** In accordance with literature sources the following local species can be found currently in Aragvi, its tributaries and Zhinvali reservoir:

Salmon (*Salmo fario*) with length some 20-25 cm, weight 100-200 grams, spawning in low depths, gravel-sand habitats, putting eggs in dug out pits and covers them with sand after fertilization; Caucasian *Leuciscus cephalus orientalis Nordmann*; Mtkvari *Chondrostoma cyri*; Mtkvari *Gobio persa Gunther* or in local language Petvia, Ghomgha, or Chochia; (*Varicorhinus capoeta*, in local language Khramuli or alternatively Pitskhula, Lurja, Kapueti, Tsotskhali; *Barbus capit*, or Chanari in Georgian transcription; *Barbus mursa*, i.e. Murtsa or Tsimori in Georgian, with length of some 40 cm, weight reaching 500 grams, spawning period covering May-June, taking place in gravel-sand areas; Mtkvari Tsvera or 'Feminine Murtsa', *Barbus lacerta curi Filippi* in Latin; *Coregonus albula* or Chapala; *Aspius taeniatus* or Redlip Cherekhi; *Chalcalburnus*, in Georgian Trisa or Shamaia, which reaches Ananuri upstream of Aragvi, length 40 cm, weight up to 500 g, spawning season spanning from May till end of September.

Data on fisheries are not available for the Dushetiskhevi but fish can migrate to and from Aragvi. Current structures in the riverbed (second culvert in particular) actually intercept the fish movement; therefore design option should consider solution beneficial in terms of ecological conditions for aquatic resources (removal of barriers for fish migration).

The engineering designs and respective construction works (bridges, riverbed recontouring) should ultimately result in conditions favorable for the passage of at least the following local fish species across the barrage weir: *Salmo fario*, *Gobio persa Gunther*, *Varicorhinus capoeta*, *Barbus mursa*, *Barbus lacerta curi Filippi*, etc. (with velocities ranging from 1.0÷1.2 m/sec for *Salmo fario* to 0.3÷0.5 m/sec for other species).

### **3. Current Land Use**

The project as conceived currently does not envisage land acquisition, resettlement or losses of income or property. Temporary inconveniences will be created for land and property owners next to sites subject to rehabilitation along the Dushetiskhevi riverbed. In case resettlement becomes necessary, equitable compensations or other benefits should be provided, in accordance with internationally accepted criteria and guidelines (such as those set by World Bank resettlement safeguards).

Current land use along the Dushetiskhevi riverbed and its influence area is unsustainable. The project should advise and agree with Dusheti local authorities introducing setback zones to regulate no-settlement and no-construction areas and gradually to naturally (through regulations enforced with equitable compensations) relocate households and businesses from flood impact areas to ensure long term sustainability and risk reduction.

### **4. Population Characteristics and Proximity to Public Facilities**

As mentioned above, some 7000 population settled in local settlements around Dusheti (Kobiaantkari, Sulikiantkari, Shalikiantkari and Mtvareliantkari) are located within the project influence area, while estimated 300 persons are living in immediate vicinity to the Dushetiskhevi site.

More population and some businesses (such as small capacity gas station right at the bank of the river, placed near the edge of the retainment wall) are located along the left bank of the river. Hard bank protection structures would be more appropriate on this site (where Dusheti proper is located) to protect population from river action. Dusheti authorities should consider and commit relocation of the gas station (and any other hazardous facilities) to safe distance from the river body and population.

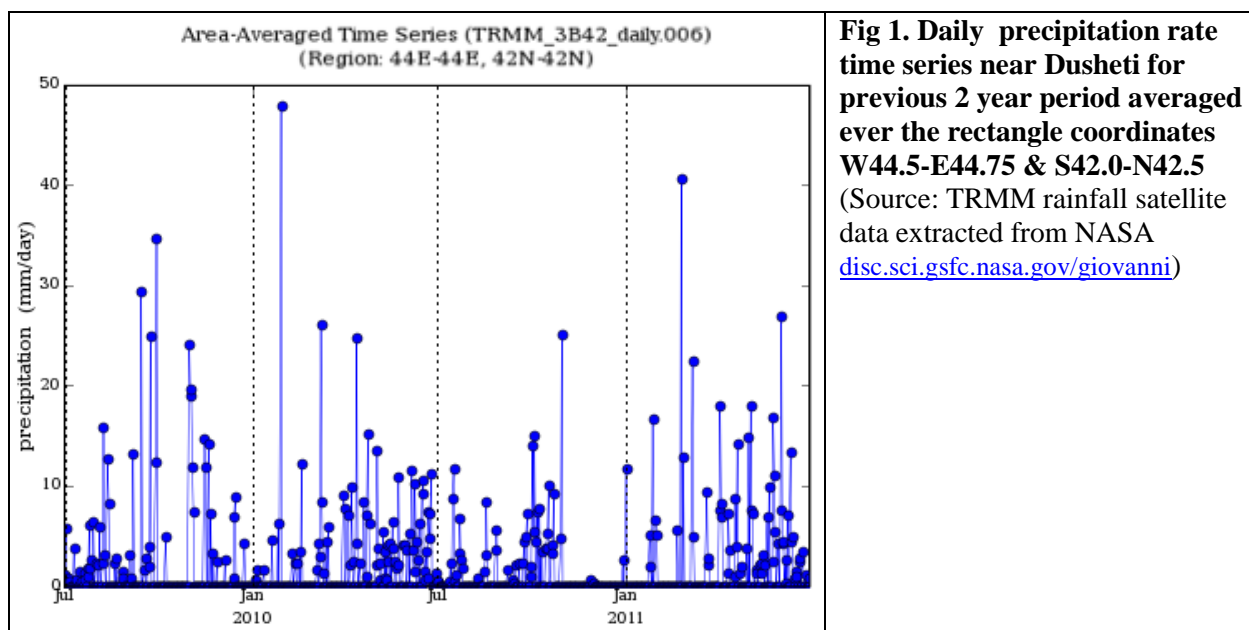
## 5. Current Environmental Conditions in the Area of the Site

### 5.1 Environmental Setting

**Climate.** The climate of Dusheti region is transitional towards the humid subtropical and is characterized by hot summer, and two minimums of precipitation. The annual amount of precipitation ranges between 525-585 mm. The maximum amount of precipitation comes in May - 84 mm, whilst the minimum amount comes in August - 34 mm. As for seasonal distribution of the precipitation, Dusheti region is characterized by maximum amount of precipitation in spring and summer and minimum amount of precipitation in autumn and winter.

The annual average temperature of January is 0-1.5°C and of August - 23.2-26°C. The absolute minimum temperature is -31°C; absolute maximum is 38-40°C. Table shows multiyear averages:

Average Temperatures												
Months	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Temperature	-0,6	0,5	5,6	10,5	16,0	19,4	23,4	24,5	19,2	13,1	5,9	1,1
Year	11.55											



Easterly as well as westerly winds blow throughout the year. The interannual distribution of wind direction: is North – 3%, North-East – 2%, East – 35%, South-East – 18%, South – 4%, South-West – 3%, West – 24%, North-west – 11%, non-windy weather – 36%.

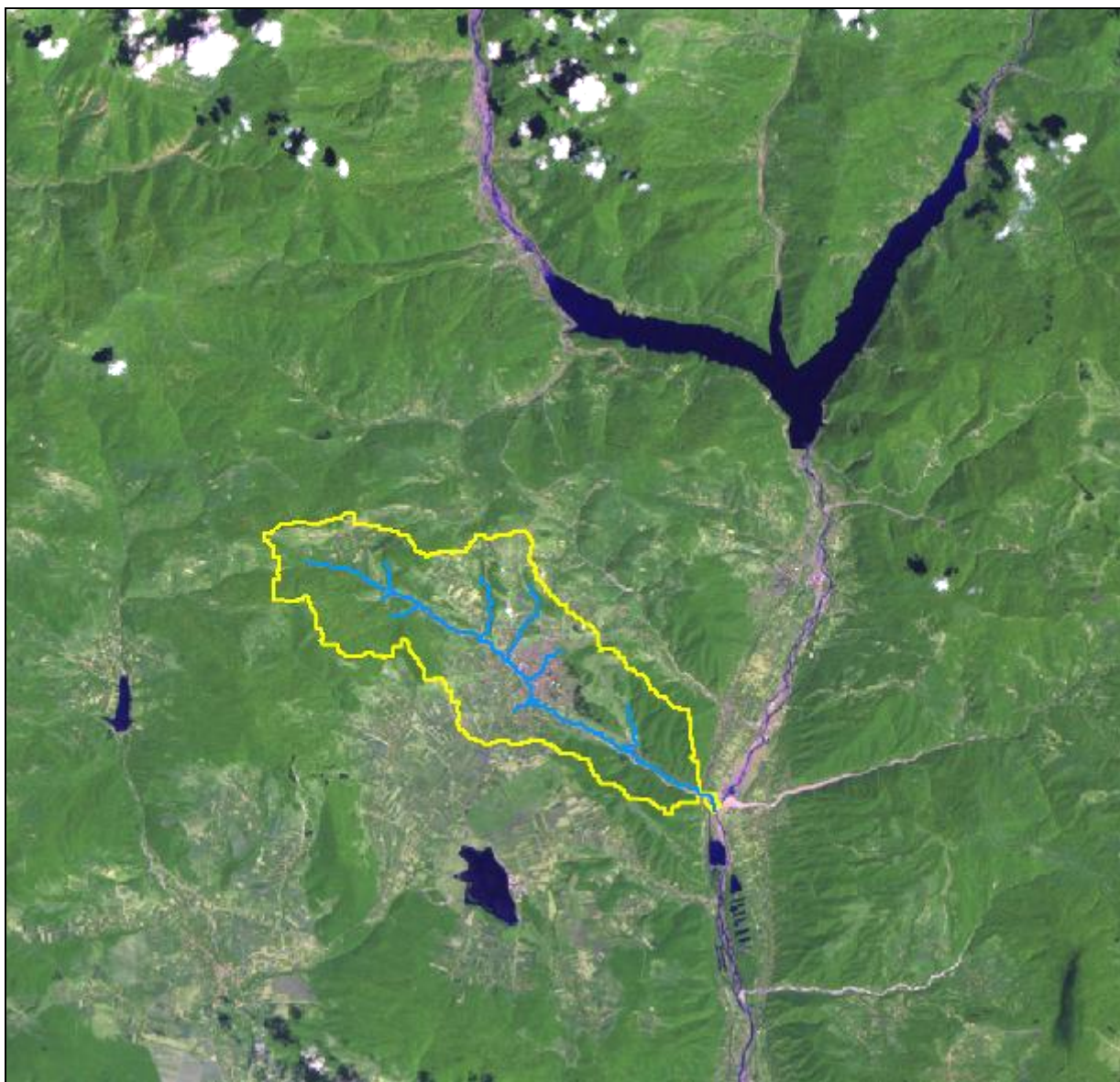
**Hydrology and hydraulics.** Dushetiskhevi River borders Dusheti settlement from the west. The river's takes its source in the mountains and flows into the riv. Aragvi. The length of the river is approximately 13 km, catchment area about 36.3 km<sup>2</sup>, collecting waters and sediments from its tributary streams.

Specific flow data is not available for the Dushetiskhevi River and estimations are used to develop hydrological parameters. The river is obviously subject to large variation as evidenced by conditions in the active channel (i.e., bank erosion, scouring and re-deposition). High flows generally occur in the spring and are associated with runoff from higher seasonal precipitation in May-June period. The river can be violent during the flood surge, for instance in 2005 entire opening of the bridge culvert was reportedly overtopped during the peak flow period.



Dushetiskhevi river gorge, which has a permanent flow of water and box-shaped cross profile, within the limits of the Dusheti settlement is narrows to a 15-20 meter width between the dirt road running along the left bank with local household properties protected in some places by additional retainment walls, and relatively less developed right bank with number of households and their properties, as well as some agricultural plots and eroding banks with natural cliffs. Further downstream of Dusheti area the river gorge gets wider with bottom width of 25-30 m.

From previous hydraulic studies by Georgian hydrologists (at a location several km downstream from the current activity) characterized flow regimes, velocities, scour depth for the river are available. The maximum flow for a 1:100 year return event was estimated to 135 m<sup>3</sup>/sec and the maximum velocity at 2.04 m/sec. The river is known for its mud flow, for which the flow was assessed as 163 m<sup>3</sup>/sec. The depth of erosion of the riverbed has also been assessed based on the above velocities and flows, with maximal generalized scouring depth estimated at 3.9 meters below the 100 year frequency flood level. Minimal diameter of rip-rap stones, if used, was estimated at 0.8 m.



**Map 4.** Dusheti and Dushetiskhevi River Catchment (source: Landsat 5 TM, July 13, 2009)



## 5.2 Site Drainage and Ecology

The project envisages rehabilitation of sections of quite degraded riverbed; therefore impact on vegetation is indeed minimal on the left bank and present but manageable on the right bank. Due to urban environment encountering of wild animals is quite negligible. In terms of drainage and pollution, the works will be proceeding in the riverbed and prevention and control of the pollution should be the strong priority. Due to mismanagement of wastewater and household waste collection in Dusheti and in the entire catchment, the sanitary condition in the riverbed is quite precarious and project should engage with local municipal authorities to introduce respective environmental management measures including not only Dusheti but also the entire catchment area.

It should also be mentioned that downstream the confluence with Aragvi Tbilisi water supply head facility is located at v. Natakhtari. Downstream the project site Dushetiskhevi flows into Aragvi River in some 4-5 km distance and discharges into this river in the area close to the series of drinking water supply reservoirs and fish ponds which are fed by Aragvi River. In case of an accidental spill at the construction site into the riverbed these reservoirs and fish ponds could ultimately be impacted.

The measured quality of surface water and groundwater at the location is unknown, but very likely it is strongly compromised by the wastewater from settlements and haphazard dumping of the waste: the works site is seriously contaminated with different kinds of household waste. There will be significant nuisance to workforce and accumulated waste should be adequately disposed off the site. The work area will have to be cleaned completely of such waste by the Contractor, and they will be responsible for prevention of additional illegal dumping throughout the construction period.

## 6. Conclusions on Baseline Conditions

Based on the findings of the baseline analysis, (i) there can be certain significant environmental concerns for the rehabilitation activities, but these seem to be mitigable with adequate environmental management and monitoring; (ii) improvement of environmental condition and public safety is expected during operation phase.

## D. LEGAL, REGULATORY AND PERMITTING REQUIREMENTS

### 1. *Please describe the national environmental impact assessment requirements for this site*

**Requirements of Georgian Legislation.** The project does not require the Environmental Impact Permit (EIP) and/or State Ecological Expertise (SEE) under the Georgian legislation, since in accordance with the Article 4 of the Law of Georgia on Environmental Impact Permits, rehabilitation or arrangement of river bank revetment structures and rehabilitation-reconstruction of two bridges is not listed as the type of project subjected to EIP or SEE. Likewise, setting Norms for Maximum Permissible Level of air and water emissions are not required either.

According to current legislation, water and air emissions during rehabilitation and operation of the project facilities should comply with the Norms established by the Technical Regulations of the Environmental Protection.

2. Please list the local permits that must be obtained for this site, process for obtaining them and the schedule for obtaining them:

Permit Type	Schedule
Zoning	To be addressed by the engineering design company and the works contract Client (MDF).
Building/Construction	To be addressed by the engineering design company and the works contract Client (MDF).
Source Material Extraction	To be addressed by the engineering design company and the works contract Client (MDF). Materials should be imported from permitted/licensed sources (alternatively contractor should obtain such license).
Waste Disposal	Non-hazardous waste: clearance with local authorities. Hazardous waste: only to be disposed at approved hazardous waste disposal facilities.
Wastewater	Clearance with local authorities (camps and staging areas, other discharge points).
Air	Compliance with air emission standards.
Water Use	Clearance with local authorities.
Historical or Cultural Preservation	In case of chance finds immediate stop work order and acting in clearance with Ministry of Culture and Monuments of Georgia.
Wetlands or Waterbodies	Works are proceeding in the riverbed.
Threatened or Endangered Spp.	-
Other	<b>NB: Rehabilitation of arrangement of river bank revetment structures and rehabilitation-reconstruction of two bridges and any other works in the river and floodplain and respective regulation and strict supervision zone(s) should be cleared with the Ministry of Infrastructure and Development, which is now in charge of the implementation of the Law on Regulation and Engineering Protection of Sea, Water Bodies and Rivers of Georgia (2000, with several amendments). It is advised to clear design ideas with this agency at an early stage, as well as to invite them for periodic supervision and for final acceptance.</b>

3. Please list additional host government environmental laws or environmental standards that the site must comply with?
- Air emission standards
  - Water discharge standards
  - Solid waste disposal or storage regulations
  - Hazardous waste storage and disposal
  - Historical or Cultural Preservation
  - Other

The laws that are considered to be directly or indirectly related to this project could be listed as follows:

**Environmental protection:**

- Law on Environmental Protection (1997, amended in 2000, 2003, 2007)
- Law on Environmental Impact Permits (2007)
- Law on Ecological Expertise (2007)
- Law on Environmental Protection Service (2008)

**Conservation of natural resources:**

- Law on Soil Protection (1994, amend. 1997, 2002)
- Law on Natural Resources (1996)
- Law on Water (1997, amend. 2003, 2004, 2005, 2006)
- Law on Regulation of Forest Use (1998)
- Law on Protection of Ambient Air (1999, amend. 2000, 2007)
- Law on Minerals (1996)

**Conservation of nature and biodiversity:**

- Law on Wildlife (1997, amend. 2001, 2003, 2004)
- Law on Red List and Red Book of Georgia (2003, amend. 2006)

**Environmental security:**

- Law on Hazardous Chemicals Substances (1998, amended in 2006, 2007)
- Law on Compensation of Damage from Hazardous Substances (1999, amended in 2002, 2003)
- Law on Resorts and Sanitary Protection of the Resort Zones
- Law on Pesticides and Agrochemicals (1998)
- Transit and Import of Hazardous Waste within and into the Territory of Georgia

**Land use:**

- Law on Land Registration (1996)
- Law on Procedure for Expropriation of Property for Necessary Public Needs (1999)

**Various:**

- Law on Tourism and Recreation (1997)
- Law on Licensing Design-Construction Activities (1999)
- Law on Cultural Heritage (1999, amend. 2007)
- Law on Regulation and Engineering Protection of Sea, Water Bodies and Rivers of Georgia (2000, with several amendments)
- Law on Licenses and Permitting (2005)

**Environmental standards** in Georgia establish requirements towards the environmental quality and are determining Maximal Permissible Concentrations (MPC) in water, air and soil for substances harmful to human health and environment. These environmental quality standards and norms are set in accordance with the Law on Public Health, in concordance with the Law on Environmental Protection and the Law on Water.

As prescribed by the listed legislation, the Order No. 297/N dated 16.08.2001 issued by the Minister of Labor, Health and Social Affairs of Georgia established a set of environmental quality and sanitary norms and rules in various domains, dealing with surface water supply systems; surface water pollution; sanitary protection zones; air pollution norms; sanitary norms and rules for soils with regard to wastewater, application of fertilizers and irrigation; groundwater pollution; noise and vibrations; electromagnetic radiation.

**Maximal Permissible Concentrations.** Limits for emissions/discharges of harmful substances (in water, air, soil environments) determine maximal permissible levels for emissions/discharges. The lists of substances are given in the Order of the Minister of Environment Protection and Natural Resources of Georgia No. 139 dated 25.11.1999 On Approval of Hazard Coefficient for Harmful Substances Emitted from Stationary Sources. Maximal Permissible Concentrations (MPCs) for concentrations of harmful substances in water objects are established by the Law on Water. MPCs are determined on an individual basis for each particular facility.

**International agreements.** Georgia is party to number of important international conventions and agreements (see all references on the webpage <http://aarhus.ge/index.php?page=153&lang=eng>).

4. *Please describe U.S. or other international standards that the Site must comply with.*

**International standards.** It is proposed that together with Georgian legislative requirements for environmental quality the project to comply with relevant standards of international financing institutions, such as those listed in the IFC's Pollution Prevention and Abatement Handbook (see at [http://www.ifc.org/ifcext/sustainability.nsf/Content/Publications\\_Handbook\\_PPAH](http://www.ifc.org/ifcext/sustainability.nsf/Content/Publications_Handbook_PPAH)) as well as the IFC's Environmental, Health, and Safety General Guidelines, which is available at <http://www.ifc.org/ifcext/sustainability.nsf/Content/EHSGuidelines>.

## E. ENGINEERING SAFETY AND INTEGRITY

1. *Have engineering designs and plans been developed by a qualified engineering?*  
Not yet, they will be.
2. *Do designs and plans effectively and comprehensively address management of storm water runoff and its effects?*  
Not yet, they will be.
3. *Do designs and plans effectively and comprehensively address reuse, recycling, and disposal of construction debris and by-products?*  
See EMMP.
4. *Do designs and plans incorporate pollution prevention measures, wherever appropriate?*  
See EMMP.
5. *Do designs and plans effectively and comprehensively address environmental management of mobilization and de-mobilization?*  
See EMMP.
6. *Are there known geological hazards such as faults, landslides and unstable soil structure that affect the site? If so, how will you ensure engineering integrity of any structures?*  
Culvert bridges and Dushetiskhevi stream pose engineering risks due to flood impact. Geohazards (soils instabilities at banks and bridges) are anticipated. Engineering will be part of construction contract.
7. *Will the site require grading, trenching, or excavation? Will the site activity generate borrow pits? If so, how will these be managed during implementation and closure?*  
Aggregate materials would be required from nearby extraction sites. Materials should be imported from licensed sources, or contractor should obtain license. It is expected, that the large amount of material and construction debris will be removed from the riverbed.
8. *Will the site activity cause interference with the current drainage system?*  
Construction contract will cover.
9. *Will the site activity interfere with utility transmission such as above and below-ground cables; water, sewer and gas lines; etc.?*  
It is anticipated that some interference with municipal infrastructure would take place. There are number of piping and cabling crossings of various nature visible over the river. The design team and construction contractor should address these issues through detailed design, clearances with local utility service and pre-construction survey, restoration of all services if intercepted.

10. *Is an emergency plan included in the engineering plans and designs?*  
Response to small spills and minor incidents would be addressed with EMMP. Construction will be proceeding in the riverbed, therefore pollution prevention and control plan will have to be developed.
11. *Does the site activity increase risk of fire, explosion, or hazardous chemical releases?*  
No.
12. *Does the site activity require disposal or retrofitting of PCB-containing equipment (e.g., transformers, florescent light ballasts, etc.)?*  
No.
13. *Is the site activity associated with occupational safety and health hazards? If so, has a health and safety action plan been developed?*  
See EMMP.

Feasibility and environmental scoping studies were conducted by Georgian engineering companies, contracted by MDF. Design assignment is to be also commissioned by MDF as soon as practicable. Task of the engineering design team should include due consideration of the provisions of this SS ECP, including addressing all above listed sound engineering issues.

## F. ENVIRONMENTAL CONSEQUENCES

General checklist for environmental consequences is provided in Attachment F.1, while below more detailed treatment is given for various environmental and social issues.

### 1. Potential Impacts to Public Health and Well-being

- a. *Will the site activities require resettlement of any portion of the surrounding community?*

As an alternative the resettlement (with relevant compensation) of the inhabitants living nearby the Dushetiskhevi riverbed in most high risk areas should be considered in addition to proposed technical solutions. This should be combined with improved land use regulations, restricting any further developments in the flood impact areas, so that Dusheti and its inhabitants benefit from the project through long-term and low cost solutions of planning and management, rather than only of investment nature. Also, some issues may arise in case of adjacent temporary land take during construction works.

- b. *Will area residents and/or workers be exposed to pesticides, fertilizer, or other toxic substances as a result of farming or manufacturing?*

No.

- *If so, how will you ensure that these chemicals do not penetrate into ground water or flow into surface water?*
- *If so, how will you ensure that workers wear protection clothing to prevent exposure?*
- *If so, what measures will be taken to control releases of these substances to air, water, and land?*
- *If so, how will the site be restricted to remove the potential for human exposure?*



- c. *Will the site activity generate wastes from pesticides, chemicals or industrial wastes that will contaminate ground and surface water supplies used for bathing and drinking water?*

No.

- d. *Will the site activity result in odor or noise from livestock facilities that may disturb local communities or contaminate surface or groundwater?*

No.

- e. *Will the site activity generate wastes including construction debris, dry or wet cell batteries, florescent tubes, aerosol cans, paint, solvents, etc.? If so, how will this waste be disposed of?*

It is expected, that the be large amount of material and construction debris, such as demolished concrete and asphalt waste will be removed from the riverbed, as well as illegally disposed household waste. The project will also generate some of its own wastes, demolished concrete, wet batteries as well as non-hazardous waste, but these impacts will be controlled through waste minimization and disposal at appropriate approved sites.

- f. *Do site activities require the removal of asbestos-containing building materials or include the use of building materials that may contain asbestos, formaldehyde, or other toxic materials? Can you certify that building materials are non-toxic? If so, how will these wastes be disposed of?*

The project activates will not use asbestos and is not expected to generate asbestos-containing waste. Any hazardous waste generated in some activities will be disposed of safely at permitted hazardous waste disposal facility.

- g. *Does the site activity provide a new source of drinking water for a community? If so, how will you monitor the new drinking water source to ensure that it is free of contaminants that may harm human health?*

The project will not provide drinking water sources for communities.

- h. *Will construction or refurbishment activities associated with demolition or blasting result in increases in noise, air and light pollution due to increased traffic, construction operations and increase in light that will be disturbing to the surrounding community?*

Rehabilitation works will result in noise and air pollution, but impacts will be local and temporary and can be minimized through mitigation measures. Light pollution will not be an important issue.

- i. *Does the site activity generate sewerage wastes? If so, how will this be controlled?*

Workers camps and staging areas will generate some wastewater. The camps will as a minimum be provided with the temporary sanitation on site, such as septic tanks and/or mobile toilets of sufficient capacity, collecting and discharging wastewater in compliance with the requirements of the regulations.

- j. *Will the site activity involve burning of wood or biomass for cooking? If so, please describe the ventilation system?*

No.

## **2. Land Use Changes and Impacts**

- a. *Will the site activity convert fallow land to agricultural land?*

The site activities will not convert fallow land into agriculture land.

- b. *Will the site activity convert forest land to agricultural land?*

The site activities will not convert forest land into agriculture land.

- c. *Will the site activity convert agricultural land to urbanized area?*

The site activities will not convert agriculture land into urbanized area.

- d. *Will chemical containers be stored at the site?*

Chemical containers will not be stored at the site.

- e. *Will the site activity generate solid wastes that will be deposited to land resources?*

The site activities will not generate solid wastes that will be deposited to land resources.

- f. *Will the site activity generate solid or hazardous wastes such as construction debris, dry or wet cell batteries, florescent tubes, aerosol cans, paint, solvents, etc.?*

It is expected, that the large amount of material and construction debris, such as concrete and asphalt waste, will be removed from the riverbed, as well as illegally disposed household waste. The project will also generate some of its own wastes, such as demolished concrete, wet batteries as well as non-hazardous waste, but these impacts will be controlled through waste minimization and disposal at appropriate approved sites.

- g. *Does the site activity generate medical wastes? If so, how will it be handled onsite and disposed of offsite?*

The site activities will generate very limited amount of medical waste (worker's healthcare) which can be easily controlled through waste management plan. Medical waste might be identified in illegally dumped household waste in the riverbed and such hazardous wastes should be dealt with appropriately and disposed of in approved facility.

- h. *Will the site activity require onsite storage of liquid fuels or hazardous materials in bulk quantities?*

The site activities will require onsite storage of liquid fuels or hazardous materials in limited quantities, but these will be controlled through pollution prevention and control arrangements, see EMMP.

- i. Will the site activity result in mineral extraction such as granite, limestone, coal, lignite, oil, gas?*

The site activities will not result in mineral extraction.

- j. Will the site activity alter the view shed of the area community or residents?*

The site activities will not alter viewsheds of the communities or residents. Rehabilitated will have positive impact on urban and streamside viewscape. Current culvert bridges and bank protection structures are unsightly and well designed engineering structures would significantly improve visual appeal. In case of soft engineering solutions (rip-raps, gabions) visual impact would be smoothened.

### **3. Water Use Changes and Impacts**

- a. How far is the site located to the nearest river, stream or lake?*

All site activities are actually planned within the riverbed of Dushetiskhevi, but with due attention to pollution prevention and control planning and implementation, site activities will not have impact on its water resources.

- b. What is the depth to groundwater at the site?*

All site activities are actually planned within the riverbed of Dushetiskhevi, therefore groundwater is reaching the surface.

- c. Will the site activity result in an increase in groundwater extraction? If so, what is the volume?*

The site activities will not result in the increase of groundwater extraction.

- d. Will the site activity result in an increase in surface water withdrawals? If so, what is the volume?*

The site activities will not result in the increase of surface water withdrawals.

- e. Does the site activity result in increased storm water run-off?*

The site activities will not result in increased storm water run-off, rather construction activities will contribute into the reduction of flood risks.

- f. Will the site activity result in the runoff of pesticides, fertilizers or toxic chemicals into surface water?*

The site activities will not result in the runoff of pesticides, fertilizers or toxic chemicals into surface water.

- g. Will the site activity result in fertilizer, pesticide and toxic chemical contamination of groundwater?*

The site activities will not result in fertilizer, pesticide and toxic chemical contamination of groundwater.

- h. Will the site activity result in discharge of livestock wastes such as manure or blood into surface water?*

The site activities will not result in discharge of livestock wastes such as manure or blood into surface water.

- i. Does the site require excavation, placing of fill, or substrate removal (e.g., gravel) from a river, stream or lake?*

The sites activities will require excavations, placing of fill, and some substrate removal (gravel) from river. Respective mitigation and monitoring measures are specified, including the use of only licensed sources of material extraction. It is also expected, that the large amount of material will be removed from the riverbed and there will be the need to reuse or to dispose of at appropriate location.

- j. Is there potential for discharges of waste water or potentially contaminated (including suspended solids) storm water from the site?*

Some potential exists for discharges of waste water (camp sites) or contamination (suspended solid run-offs from work areas), therefore respective mitigation and monitoring measures are specified.

- k. Will the site activity disturb wetland, lacustrine, or riparian areas?*

The site activities will actually proceed in the Dushetiskhevi riverbed.

#### **4. Impacts to Forestry, Biodiversity, Protected Areas and Endangered Species**

- a. Is the site located in an endangered or threatened species habitat? Is there a plan for identifying endangered or threatened species during site activity implementation? If such species are identified during implementation, describe the process for notifying authorities?*

Baseline studies did not report the presence of endangered or threatened species.

- b. Is the site located in a migratory bird flight path?*

Baseline studies did not report the issues with migratory bird flight paths.

- c. Is the site located adjacent to a protected area, national park or wildlife refuge?*

There are no protected areas within the site activities area. Baseline studies did not reveal any impact on protected/conservation areas elsewhere.

- d. Will the site activity generate an increase in carbon emissions?*

CO<sub>2</sub> emissions will be associated with heavy equipment works during the rehabilitation phase.

- e. Will the site activity involve decommissioning of systems that contain ozone depleting substances?*

The site activities do not involve decommissioning of systems that contain ozone depleting substances.

*f. Will the site activity alter the area's microclimate?*

The site activities will not alter the area's microclimate.

*g. Will the site activity involve harvesting of non-timber forest products such as mushrooms, medicinal and aromatic plants (MAPs), herbs, and/or woody debris?*

The site activities are not concerned with harvesting of non-timber forest products such as mushrooms, medicinal and aromatic plants (MAPs), herbs, and/or woody debris.

*h. Will the site activity involve tree removal or logging? If so, please describe.*

The site activities do not involve tree removal or logging. Some limited clearance of vegetation might be involved in the riverbed riparian areas (on the right bank in particular), but these will be isolated cases and will be mitigated through replanting or self-generation of the plant and tree cover.

## **5. Historic or Cultural Resources**

*a. Are there cultural or historic sites located at or near the site? If so, what is the distance from these? What is the plan for avoiding disturbance or notifying authorities?*

Baseline studies report that there are no natural, cultural and/or archeological monuments within the works right of way area. Considering the fact that the project envisages rehabilitation of existing system, the chances to discover, or risks of impacting archeological monuments are considered as low. EMMPs specify that in an unlikely event that such resources are detected, measures will be taken in accordance with the provisions of the Georgian legislation and the best international practice.

*b. Are there unique ethnic or traditional cultures or values present in the site? If so, what is the preservation plan addressing these?*

There are no ethnic or traditional cultures or values present in the site. Actually rehabilitation of the riverbed in harmony with natural dynamics and riverbed cleanup might enhance the value of the Riverine system for the Dusheti community and stimulate local interest in the better care and protection of the river and its catchment.

## **G. SITE CLOSURE AND HAND OVER**

*1. If this site activity involves construction or renovation, what phases are involved (mobilization, site preparation and staging; implementation; waste disposal; site restoration; closure; handover; etc.)?*

All indicated phases are involved for rehabilitation works, plus operation phase.

*2. Please briefly describe the environmental impacts that must be addressed during each of the phases?*



Impacts are described in more detail in attachments I.1 and I.2, but herewith are provided indicative impact themes attributed to each phase listed:

*Mobilization:* impact on road traffic and pedestrians; noise and air emissions (dust, exhausts)...

*Site preparation and staging:* compacting soil, mobilization of sediments, contamination of waters and spread of water diseases; introduction of transmittable diseases...

*Implementation:* contamination of surface and ground water (sediments, spills, construction waste); noise and dust and air emissions; erosion; siltation; spread of transmittable and water born diseases; works hazards and related health and safety risks...

*Waste and wastewater collection and disposal:* contamination of land, water and groundwater resources; spread of pathogens and disease vectors...

*Site restoration:* erosion; siltation; site clean-up...

*Closure and handover:* decommissioning of camp and staging areas...

*Operations:* impacts of maintenance activities and related safety hazards; erosion and sediments; changes in hydrology patterns...

3. *Will the host country recipient organization have the capacity to sustain the environmental management aspects of the site activity after closure and handover?*

Local authorities should be able to maintain the rehabilitated riverbed and bridges and implement related environmental monitoring and management measures, as well as set necessary development controls and regulations along the riverbank zones with no-construction setback zones established.

## **H. RECOMMENDED ACTION**

Environmental planning and feasibility studies for the project (GMIP) to help define potential interventions are being finalized. Tetra Tech has conducted an analyses based on the results of these studies and their own site investigations. Based on the results of this analysis presented in the form of an Checklist for Environmental Consequences and Leopold Matrix (see attachments F.1 and I.1 compiled in the format specified in the approved IEE [DCN: 2010-GEO-033]), it was determined that the potential adverse impacts of the rehabilitation work proposed Dushetiskhevi riverbed are site-specific and short-term, that few of the impacts are irreversible, and that mitigatory measures can be designed to deal with the adverse impacts. Overall, the proposed works would result in net positive impacts with implementation of the proposed mitigation measures. Accordingly, the site-specific Environmental Mitigation and Monitoring Plan (EMMP) have been drafted to address identified environmental impacts.

The objective of this SS ECP is to describe the potential environmental and social impacts of the rehabilitation work and to provide project-specific through mitigation requirements in EMMP, with monitoring and institutional measures to be taken during project implementation to eliminate, offset, or reduce adverse impacts to acceptable levels. Mitigations will cover mobilization, construction, cleanup, and advising local authorities with mode of operations after construction. GMIP therefore proposes to prepare this Site Specific Environmental Compliance Plan and EMMP in response to requirements stipulated in approved IEE [DCN: 2010-GEO-033]).

Site Specific Environmental Compliance Plan describes project activities, baseline environmental conditions and environmental consequences. This information is used to identify significant environmental impacts during the rehabilitation and operation phases and appropriate mitigation measures for each program step and monitoring measures to insure mitigations are implemented in project design and implementation contracts.

The Site Specific Environmental Compliance Plan pays additional attention to engineering safety and integrity, public health, site closure and handover. EMMP is tailored to site-specific needs with improved links between activities, impacts, mitigations, monitoring indicators, monitoring/reporting frequency and identifying responsible parties for each measure. There is an associated Record of Compliance with Site-Specific EMMPs that covers mobilization and site preparation, implementation, site closure and activity handover.

As such it is therefore recommended that the project does not carry out an in-depth environmental assessment and the Negative Determination with Conditions would apply and a detailed Mitigation and Monitoring Plan be developed (see highlighted option 3 below):

1. The project has no potential for substantial adverse environmental effects. No further environmental review is required.\*
2. The project has potential for adverse environmental concerns (baselines section and water quality issues) and/or environmental impacts; however the recommended mitigation measures will be developed and incorporated in to the project design phase. The recommended mitigation measures will be approved by the MEO in consultation with the BEO. Monitoring of mitigation done will be documented in a monitoring report and sent to the BEO at AID/W.\*
3. **The project has substantial but mitigatable adverse environmental effects and requires measures to mitigate environmental effects. Environmental Mitigation and Monitoring Plan (EMMP) must be developed and approved by the BEO and/or REO prior to implementation. EMMP is to be attached to the Scope of Work.\***
4. The project has potentially substantial adverse environmental effects, but requires more analysis to form a conclusion. A Scoping Statement must be prepared and be submitted to the BEO for approval. Following BEO approval an Environmental Assessment (EA) will be conducted. Project may not be implemented until the BEO approves the final EA. For activities related to the procurement, use, or training related to Pesticides a PERUSAP will be prepared for BEO approval.
5. The project has potentially substantial adverse environmental effects, and revisions to the project design or location or the development of new alternatives is required.
6. The project has substantial and unmitigable adverse environmental effects. Mitigation is insufficient to eliminate these effects and alternatives are not feasible. The project is not recommended for funding.

**\*Note regarding applicability related to Pesticides (216.2(e)):** The exemptions of §216.2(b)(1) and the categorical exclusions of §216.2(c)(2) *such as technical assistance, education, and training* are not applicable to assistance for the procurement or use of pesticides.

## **I. SITE-SPECIFIC ENVIRONMENTAL IMPACTS, MITIGATION & MONITORING PLANS**

Potential impacts from site-specific project activities on various environmental components (physical, biological and social) were analyzed using checklist for environmental consequences (see Part F and Attachment F.1) and Leopold Matrix tool (see table in Attachment I.1) in order to identify significant environmental impact areas. Project related significant impact areas are then presented in Attachment I.2, grouped into *rehabilitation* and *operation* phases.

This section provides, in the form of the plain text, the general provisions for environmental management at the site, and then compiles (see attachments indicated below) into the form of tables a description of the mitigation measures that will be implemented to avoid or minimize the potential negative environmental and social impacts of the rehabilitation work. These tables list site-specific construction activities correlated with identified environmental and social impacts, provides site-specific mitigation measures, as well as deals with the monitoring arrangements to ensure that the construction

and operation of the project conforms to respective environmental and social requirements. Key parties responsible for implementation, supervision and regulation, as well as the timing of the application of monitoring actions are also defined. The following common measures and the key mitigation provisions specific to this site are listed below.

### **General Provisions:**

General measures that will be implemented to ensure that environmental impacts are avoided or mitigated include, but are not limited to, the following:

- Delimitation of a buffer zone around the site;
- Safety warning signs, authorizing only project personnel;
- Adequate signage to ensure that areas delimited by the project are respected.
- Construction/staging/dwelling bases/camps of the contractor will be arranged in compliance with provisions of the environmental management plan. In case of insufficient capacities of sewerage systems these bases/camps will as a minimum be provided with the septic tanks and/or mobile toilets of sufficient capacity, while collection and discharge of wastewater will be in compliance with the requirements of the legislations and environmental management plan.
- Access to the area will be done only through approved access roads.

### **Environmental Resources:**

The following environmental resources will be provided by the Contractor:

- Oil spill response equipment and materials;
- Silt control materials, including hay bales, silt fences, etc.;
- An environmental officer permanently on site supervising and monitoring the works;
- An environmental helpers in charge of collecting the waste on a daily basis and implementing environmental measures on site;
- Personnel on-site who are trained in the use of the oil spill response equipment and materials, which will be, if necessary, reinforced by additional personnel;
- Prior training of entire personnel and continuous toolbox talks to ensure that all workers are aware of the environmental and social requirements during the crossing works and have appropriate skills. Untrained and unskilled personnel not allowed participating in the works!
- Documentation folder will be made available on the site for all supervisors working on the riverbed rehabilitation, that contains all necessary general and site specific environmental management plans, procedures and method statements;
- During the arrangement of the bridges, bank protection structures and recontouring of the riverbed qualified specialist personnel should be available at the site to oversee that conditions necessary for migration of aquatic life are fulfilled.

### **Measures to Prevent or Respond to Water Pollution/Oil spill:**

- A parking area will be set up to limit the passage of vehicles across the working zone;
- No refueling operation will be authorized in less than 50 meters from the river;
- A specific refueling area (for the duration of the works), geo-textile and plastic lined, filled up with sand, will be installed in the safe distance from the river;
- All equipment working on the crossing will be inspected for potential leaks, etc. prior to starting the work and then on a monthly basis (daily basis for engines working directly into the riverbed);
- Adequate spill response contingency will be mobilized, including oil spill kits with: absorbent pads, absorbent booms, shovels, plastic and sand bags, gloves. These will be available on site during the works in the riverbed and personnel trained in the use of the equipment available on site;
- Spill contingency shall also include spaghetti booms (or equivalent equipment) to be deployed across the water downstream from the crossing point as a spill mitigation measure during construction works inside the riverbed;

- Incident reporting will be done as per requirements of the environmental emergency response plan (plan to be cleared with the Client before initiation of the works);
- Oil spill response trainings will be done on a monthly basis to relevant personnel;
- If any refueling operation closer than 50 meters from the river cannot be avoided due to emergency situations, this operation will be carried out following strictly the refueling operation (laying of geotextile, use of absorbent materials, availability of oil spill response kits) and will be attended by a representative of the environmental unit. Duration of the refueling operations taking place closer than 50 meters from the river will be minimized.
- Pollution prevention and control plan will be developed, cleared with the Client and implemented.

**Measures to Control Sediment/Silt and Erosion:**

- All construction will take place in low water level condition. It should be taken into consideration that risk of flooding increases considerably in March-June;
- Monitoring of turbidity and for the possible presence of oil sheens will take place before, during and after construction. During works inside the riverbed, turbidity will be visually monitored on a daily basis;
- Turbidity and of sediments accumulation downstream will be minimized through mitigations;
- Bulk of the river stream will be directed/collected using series of temporary dams and flume pipes of sufficient capacity. The open excavation pits is to be dewatered with pumps discharging downstream via sedimentation basin (size at least 5 x 10 x 1.5 m);
- Sufficient hose capacity will be anticipated in order to allow the de-watering into the dedicated sedimentation basin;
- At the end of the sedimentation basin filtration device will be installed (hay bales or silt fences). Environmental monitoring will ensure that no aquatic life is entrapped in the device;
- Storage of topsoil and spoil materials will not take place at less than 25 meters from the river;
- Sandbag barriers/silt fences will be installed around topsoil, subsoil and spoil storage wherever a potential washout into the river could occur;
- The trenching of the riverbed will occur last and the backfilling of the trench will be executed first with two plugs erected on the banks to physically separate the trench from the body of water;
- Dismantling of temporary dams and removal of diversion and dewatering pipes will be carried out in a sequence minimizing sedimentation/siltation downstream;
- During excavation operations, the top 30 centimeters layer of the riverbed material shall be excavated first and stored separately for topping the reinstatement across the river;
- Final erosion control works will be carried out in accordance with the relevant reinstatement plan (to be cleared with the Client).

**Waste Management:**

- Collection, handling and transportation of wastes generated at the site will be done as per the waste management plan (subject to clearance with the Client);
- Waste bins will be placed for proper collection and segregation in a marked/signed and dedicated area;
- Their collection will be organized on the construction site on a daily basis;
- The waste will then be transported to the approved disposal site;
- Provision of adequate mobile toilet facility for workforce including treatment plant of appropriate capacity or with regular disposal at approved discharge point;
- A designated and marked hazardous waste area will also be installed, and equipped with secondary containment.

**Reinstatement:**

- The riverbanks and berms shall be stabilized within 48 hours after construction completion;
- The river banks and the riverbed shall be restored to their original conditions and designed contours and all necessary precautions will be taken to ensure that the natural drainage patterns are reinstated during restoration; this involves recording accurately the original natural conditions;
- Re-contouring of the riverbed for smooth passage conditions of aquatic resources;
- A pre-condition photographic and cross-section survey will be done commonly between the Client and the Contractor prior to starting the work, that will be used as a reference for reinstatement works;
- Permanent reinstatement of the riverbanks and the riverbed will be done according to engineering drawings approved by the Client (and in compliance with the provisions of the environmental management plan);
- Particular attention will be paid to revegetation on both banks along the entire length of the site (including steep slopes) to minimize long term visual impacted by implement prior agreed bio restoration measures to enhance stream protection and to mitigate visual impact.
- Well protected and stored topsoil and riverbed top layer material will be reinstated.

In addition to above listed mitigation measures of generic nature, site-specific environmental mitigation and monitoring plans were developed both for site *rehabilitation* and *operation* phases, to address project impacts:

**1. Site-specific Environmental Mitigation Plan**

Site specific environmental mitigation plans for Dushetiskhevi Flood Protection site is presented in Attachments J.1.1 (*Rehabilitation*) and J.2.1 (*Operation*).

**2. Site-specific Monitoring Plan**

Site specific environmental monitoring plans for Dushetiskhevi Flood Protection site is presented, respectively, in Attachments J.1.2 (*Rehabilitation*) and J.2.2 (*Operation*).

**3. Implementation Arrangements**

Site-specific Environmental Compliance Plan (SS ECP) is subject to review and approval by the BEO and/or REO prior to implementation. Approved SS ECP (including EMMP) must be attached to the Scope of Work, thus making it obligatory for implementation by the Contractor with the same priority of contractual treatment as Technical Specifications. Necessary quantifiable items should be identified and included in the Bill of Quantities for construction contracts. Bidding document should define financial penalties for poor performance, such as withholding set percentage of payments invoiced by Contractor if environmental requirements of the contract are not satisfactorily met and/or if preventive and corrective action requests issued by the construction works Project Manager are not duly and timely acted upon by the Contractor. Environmental performance and staffing requirements should also be defined for bidding and contract documents.

Special considerations apply to operation phase as well. All necessary plans, systems and manuals should be developed and approved prior to operation phase. Primary responsibility for maintenance and proper operation rests with the local authority (Dusheti municipality). Environmental mitigation plan (as well as health and safety arrangements) developed for these rehabilitation activities apply to all rehabilitation activities during operation and maintenance phase as well, to be undertaken by the local authorities and/or its contractor(s).



**J. CERTIFICATION OF NO SIGNIFICANT EFFECTS ON THE ENVIRONMENT**

The undersigned certifies that all foreseeable significant adverse effects on the environment have been adequately and effectively eliminated or mitigated by this Site-Specific Environmental Compliance Plan. If new adverse effects, and/or the need for new or improved mitigation measures, are identified. I will notify the USAID activity manager/COTR/AOTR and the Mission Environmental Officer to ensure that the environmental report or environmental assessment is amended to reflect new findings to ensure that environmental safeguards are incorporated into project level EMMP & this site specific compliance plan.

\_\_\_\_\_  
Implementer Project Director/COP:

\_\_\_\_\_  
Date

APPROVAL: (Approval requirement specified in the IEE)

\_\_\_\_\_  
USAID/Project COTR/AOTR:

\_\_\_\_\_  
Date

\_\_\_\_\_  
Mission Environmental Officer

\_\_\_\_\_  
Date

\_\_\_\_\_  
Bureau Environmental Officer

\_\_\_\_\_  
Date

Copy Provided to (Check Box):

MEO      ☐

BEO      ☐

## ATTACHMENT F.1

**A. Summary Checklist for Environmental Consequences**

(Note: appropriate columns are checked below as Yes (Y), Maybe (M), No (N) or Beneficial (B). Y, M and B checks are briefly explained in the next Section, "Explanations". A "Y" response does not necessarily indicate a significant effect, but rather an issue that requires focused consideration.)

- |   |     |
|---|-----|
| <b>1. Earth Resources</b>   |     |
| a. grading, trenching, or excavation in cubic meters or hectare                         | _Y_ |
| b. geologic hazards (faults, landslides, liquefaction, un-engineered fill, etc.)        | _M_ |
| c. contaminated soils or ground water on the site                                       | _M_ |
| d. offsite overburden/waste disposal or borrow pits required in cubic meters or tons    | _Y_ |
| e. loss of high-quality farmlands in hectares   | _N_ |
| <b>2. Agricultural and Agrochemical</b>   |     |
| a. impacts of inputs such as seeds and fertilizers                                      | _N_ |
| b. impact of production process on human health and environment                         | _N_ |
| c. other adverse impacts  | _N_ |
| <b>3. Industries</b>  |     |
| a. impacts of run-off and run-on water  | _N_ |
| b. impact of farming such as intensification or extensification                         | _N_ |
| c. impact of other factors  | _N_ |
| <b>4. Air Quality</b>   |     |
| a. substantial increase in onsite air pollutant emissions (construction/operation)      | _Y_ |
| b. violation of applicable air pollutant emissions or ambient concentration standards   | _N_ |
| c. substantial increase in vehicle traffic during construction or operation             | _Y_ |
| d. demolition or blasting for construction  | _N_ |
| e. substantial increase in odor during construction or operation                        | _M_ |
| f. substantial alteration of microclimate   | _N_ |
| <b>5. Water Resources and Quality</b>   |     |
| a. river, stream or lake onsite or within 30 meters of construction                     | _M_ |
| b. withdrawals from or discharges to surface or ground water                            | _M_ |
| c. excavation or placing of fill, removing gravel from, a river, stream or lake         | _M_ |
| d. onsite storage of liquid fuels or hazardous materials in bulk quantities             | _M_ |
| <b>6. Cultural Resources</b>  |     |
| a. prehistoric, historic, or paleontological resources within 30 meters of construction | _N_ |
| b. site/facility with unique cultural or ethnic values                                  | _N_ |
| <b>7. Biological Resources</b>  |     |
| a. vegetation removal or construction in wetlands or riparian areas in hectare          | _Y_ |
| b. use of pesticides/rodenticides, insecticides, or herbicides in hectare               | _N_ |
| c. Construction in or adjacent to a designated wildlife refuge                          | _N_ |
| <b>8. Planning and Land Use</b>   |     |
| a. potential conflict with adjacent land uses   | _M_ |
| b. non-compliance with existing codes, plans, permits or design factors                 | _N_ |
| c. construction in national park or designated recreational area                        | _N_ |
| d. create substantially annoying source of light or glare                               | _N_ |
| e. relocation of >10 individuals for +6 months  | _N_ |
| f. interrupt necessary utility or municipal service > 10 individuals for +6 months      | _M_ |
| g. substantial loss of inefficient use of mineral or non-renewable resources            | _N_ |
| h. increase existing noise levels >5 decibels for +3 months                             | _M_ |
| <b>9. Traffic, Transportation and Circulation</b>                                       |     |
| a. increase vehicle trips >20% or cause substantial congestion                          | _M_ |
| b. design features cause or contribute to safety hazards                                | _M_ |
| c. inadequate access or emergency access for anticipated volume of people or traffic    | _M_ |
| <b>10. Hazards</b>  |     |
| a. substantially increase risk of fire, explosion, or hazardous chemical release        | _N_ |
| b. bulk quantities of hazardous materials or fuels stored on site +3 months             | _N_ |
| c. create or substantially contribute to human health hazard                            | _M_ |
| <b>11. Other Issues</b>   |     |
| a. workforce and community health and safety concerns                                   | _Y_ |

**B. Explanation of Environmental Consequences:**

(Note: this section briefly explains Y, M and B responses given in the previous section.)

1. **Earth Resources**
  - a. filling and grading is envisaged all along the riverbed as well as bridges and bank protection Y
  - c. works are proceeding in the riverbed with potential for flood hazard M
  - c. accidental spills of equipment operations directly in the riverbed is expected to have pollution impact on surface and ground water, if not mitigated M
  - d. substantial volume (over 26,000 m<sup>3</sup>) of material is to be shifted in the riverbed as well as demolished concrete and other wastes is planned to be removed from site and disposed of Y
4. **Air Quality**
  - a. construction would substantially increase local air pollution (and noise) if not mitigated Y
  - c. vehicle/equipment traffic during construction would increase substantially against baseline Y
  - e. construction equipment would be temporary source of unpleasant odors M
5. **Water Resources and Quality**
  - a. works will essentially be proceeding in the riverbed M
  - b. site run-offs if not managed adequately may reach Aragvi, feeding drinking water ponds M
  - c. substantial excavations and fills along the river banks may cause sedimentation M
  - d. fuels and other hazardous materials need adequate storage and control M
7. **Biological Resources**
  - a. works will essentially be proceeding in the riverbed, potential impacting aquatic resources M
8. **Planning and Land Use**
  - a. introduction of planning and setback instruments required to avoid future flooding impacts M
  - f. traffic will be seriously interrupted if construction is not well planned and phased M
  - h. noise levels will be significant when and where construction equipment operates M
9. **Traffic, Transportation and Circulation**
  - a. vehicle and equipment traffic during construction would increase compared to baseline M
  - b. bridges and bank protection should be designed so that flooding & erosion is addressed M
  - c. risks will be significant if works site safety and signage is not well planned and enforced M
10. **Hazards**
  - c. hazards will be significant if works site signage is not well planned and enforced M
11. **Other Issues**
  - a. workforce and community health and safety issues are important due to lack of skills and weak enforcement mechanisms Y

## ATTACHMENT I.1

Leopold Matrix (Significance of Potential Impacts) – *Rehabilitation and Operation of Dushetiskhevi Flood Protection*

<div> <div>Project Component</div> <div>Environmental Component</div> </div>		PHYSICAL ENVIRONMENT										BIOLOGICAL ENVIRONMENT										SOCIAL ENVIRONMENT									
		Agricultural Land	Soil Erosion	Slope Stability	Energy / Mineral Resources	Surface Water Quantity	Surface Water Quality	Ground Water Quantity	Ground Water Quality	Air Quality	Noise	Aquatic Ecosystems	Wetland Ecosystems	Terrestrial Ecosystems	Endangered Species	Migratory Species	Beneficial Plants	Beneficial Animals	Pest Plants	Pest Animals	Disease Vectors	Public Health	Resource / Land Use	Distribution Systems	Employment	At Risk Population	Migrant Population	Community Stability	Cultural / Religious Values	Tourism / Recreation	Nutrition
REHABILITATION	Vegetation clearing	■	■	■								■		■								■		○						■	
	Construction camp	■	■				■		■	■	■	■		■							■	■	■	■	○	■		■	■		
	Quarry management		■	■			■	■	■	■	■	■		■							■	■	■	■	○	■			■	■	
	Trucking gravel and spoil		■				■		■	■	■	■			■									■		■		■		■	
	Cutting & filling	■	■	■			■		■	■	■	■	■	■										■						■	
	Construction material use				■		■		■	■	■	■											■			■					
	Management of spoil	■	■				■				■	■		■		■															
	Storage of diesel/oils						■		■			■		■								■	■	■			■				
	Waste management						■		■	■		■	■	■				■			■	■	■	■		■				■	
	Water use		○				■		■	○	○	■	■	○				■					■	■							
OPERATION	Vehicle traffic movement		■			■	■	■	■	■	■	■										■		■	○	■					
	Bridge & bank maintenance		■			■	■	■		■	■	■											■		○	○					○
	Maintenance of machinery						■		■			■		■								■	■								
	Waste management						■		■	■		■	■	■							■	■	■	■		■				■	
	Watershed plans, setbacks	○	○	○		○	○	○	○			○				○						○	○	○			○		○	○	○

## KEY:

Adverse: ■ High ■ Medium ■ Low

Beneficial: ○ High ○ Medium ○ Low

## ATTACHMENT I.2

**Identified Significant Environmental Impacts**

The following below are the typical impacts associated with the proposed rehabilitation activities. Site-specific protection and mitigation measures are respectively developed for inclusion in the construction contracts, subject to monitoring during construction. Contractors are required to submit environmental protection plan addressing specific potential impacts for approval before construction activities are allowed to begin. The following potential negative environmental and social impacts associated with the rehabilitation work were identified:

**1. Environmental Impacts**

**Loss of vegetation and disturbance of terrestrial and aquatic life.** The rehabilitation works will have minor impacts on the existing vegetation (mostly on the right bank side), which consists of grassland, scrubs/trees and adjacent agricultural plots of local population. Disturbance will be associated with the clearing of vegetation in extra workspace areas, the improvement of access roads, and the grading along the riverbanks. Construction activities are not expected to disturb birds and larger mammals, sighting of which is unlikely due to urban setting. On the other hand, the 'waterfall' effect on the downstream side of the existing culvert bridge 2 (see photos of the site), in addition to posing significant engineering hazard, essentially intercepts any possibility for fish migration in the Dushetiskhevi stream. Engineering the smooth transition of the riverbed elevation at this location would mitigate impact on migration of aquatic life and would simultaneously contribute to site engineering safety as well.

**Additional soil erosion and sedimentation** may result from construction activities, particularly grading and trenching, bank excavation for access ramps, and construction of improvements for an access road and preparing a staging area. Excavation of the bank cliffs may result in bank slumping. An assessment of conditions will have to be made by geotechnical expert retained by the construction contractor and, if necessary, additional technical and precautionary measures will have to be taken to prevent slumping. Grading and trenching in general have the potential to cause further erosion and deposition into the channel of the river. Excavation across the active flow, along with completing the excavations for the bridge and bank protection installation, will also result in the suspension of sediments. Open cuts should be minimized as much as possible and no delays with concrete works should be allowed when the riverbed or bank cuts and trenching is initiated. These impacts are expected to be limited to the construction period (several months).

**Damage caused by temporary access roads, staging areas, and extra workspaces.** Equipment access to the construction site and riverbed will require planning to minimize disruption. The temporary access roads will require design to minimize further erosion.

**Contamination from spills.** Contamination of soils and water resources from accidental spills and poorly maintained equipment (e.g., fuels, lubricants, oil for concrete forms, etc. associated with poor management of fuel and lubricants at work sites in the riverbed, camps, vehicle maintenance depots, fueling areas) can impact water quality and fish running/spawning areas in the Dushetiskhevi River. Most of the works will be proceeding in or closed to the riverbed, therefore special care through pollution prevention and control plan will be required. The Technical Specifications of the construction contracts will have to include restrictions on activities that may be harmful to water quality and environment in general. Development and clearance of pollution prevention and control plans would be required, as well as the inspection of all equipment prior to mobilization and each deployment to work areas in the riverbed.

**Air pollution and noise.** Potential impacts may occur from air pollution, dust and noise produced by heavy construction equipment and other vehicular movement into and out of the project site. However,

these impacts are expected to be minor and short-term. There are receptors of air and noise pollution as works will be proceeding close to some households, therefore mitigation measures and best equipment and construction practices should be applied.

**Contamination from inappropriate waste disposal.** Construction debris and wastes could cause potential harm if not disposed of in an adequate manner. Illegally dumped demolished concrete and asphalt waste, household waste should be removed from the riverbed and disposed of at approved locations during and after construction. Cleanup of already accumulated waste should be undertaken and disposal reported prior to any other activity on the site. No new third party waste dumping should be allowed during and even after the works by installing adequate sign and physical barriers (for instance boulders or concrete bars temporarily blocking the access close to the river and near bridges to avoid further dumping). In construction phase waste would consist of construction waste (including from existing bridge and bank protection demolition activities), plastic containers/bags, hydrocarbons (lubricants, fuel, etc) due to use of heavy equipment and other types of non-hazardous and hazardous materials. The Technical Specifications of the construction contracts will have to require handling and disposal of construction waste in an approved manner to be monitored by the Client.

**Visual impacts.** Despite quite degraded Riverine landscape, engineered flood protection structures will be the source of permanent visual impact, which can be moderated by soft engineering methods.

## **2. Social Impacts**

**Temporary land use.** During the implementation of the rehabilitation work, some temporary land take might be required near bridges and bank protection construction areas. Construction constructor should equitably compensate local land owners in such a contingency.

**Increased traffic on local roads.** The disturbance is expected to be significant due to urban and rural setting. Traffic and access road management plan should be developed and cleared with the Client by the construction contractor.

**Influx of workers and increased demands on local infrastructure:** Construction workers may be housed in the Dusheti or nearby villages. The workers will place increased demands on the available infrastructure. The effects are expected to be minimal.

**Worker and public health and safety.** All construction activities have inherent safety risks to workers and the local communities. There are potential concerns regarding worker safety on-site (particularly excavations, bridge and bank protection construction activities), safety risks to the public associated with machinery traffic, and public health risks associated with an influx of workers. Georgian companies do not typically follow proper site safety precautions and need to be closely monitored. The Technical Specifications of the construction contracts will have to require submittal of a site specific Health & Safety Plan for approval by the Client prior to start of the construction. Compliance with approved Health & Safety Plan should continuously be monitored during the works. Potential concerns also include:

*Dust and noise.* Depending on local conditions and the vicinity of houses and communities, dust and noise may damage human health during construction. The health of construction staff may also be adversely affected by noise and dust produced from construction.

*Spread of communicable diseases.* Construction activities increase communication among rural and urban populations. This in turn increases the potential for exposure to sexually transmitted diseases (including HIV/AIDS) and other communicable diseases such as tuberculosis. Construction crews are often the first sources of such infections in an area.

*Construction works hazards.* The operation of works machinery often endangers both operators and laborers during construction, as well as the unauthorized public entering the site boundaries.



Positive, but short-lived, social impacts include employment opportunities for unskilled local laborers during construction.

Longer term positive impacts include enhanced safety and security of the public due to bank protection, improved engineering of bridges and expected protection from floods.

Many of the impacts described during the rehabilitation phase are relevant for operation and maintenance activities as well, such as impacts of construction camp or from heavy equipment use.

In addition, the local authorities, by setting well defined setback zones, should impose and enforce development controls along the riverbed and potential flood impact areas, so that increased risk from flood damage is avoided in the longer term perspective, thus maximizing the benefits of the implemented rehabilitation activities by avoiding the emergence of similar problems in the future, risks to human lives and properties, and consequent significant public expenditures.

Site safety and ecology would strongly benefit from better watershed planning and management as well. If managed in an integral way, Dushetiskhevi river gorge and its catchment can be transformed from liability into ecological asset of the Dusheti community.

## ATTACHMENT J.1.1

Site-specific Environmental Mitigation Plan – *REHABILITATION of Dushetiskhevi Flood Protection*

Activities	Impacts	Site Specific Mitigation Measures	Monitoring Action	Implementation	Timing
				Supervision	
				Regulation	
ENVIRONMENTAL					
Site preparation works  Top soil stripping and grading  Excavation	Loss of vegetation	Confine clearing and grading of onshore undisturbed areas to site boundaries and staging area, and access as approved and marked. Topsoil from green areas along the riverbanks (right side in particular) should be striped and stored segregated and its mixing with the subsoil carefully prevented. Spread topsoil for finish grading and implement revegetation measures (reinstatement) following construction. If clearance of trees and shrubs are required, these should be reinstated by planting and biorestoreation.	Inspection during construction, stop any use of unapproved areas or access roads and restore disturbances	Contractor MDF/Tt Ministry of Environment (MOE), including its central and regional authorities, as appropriate	Continuous during construction, final inspection on completion of restoration work.
In-stream activities	Disturbance of watercourse and fish	Undertake construction in the low water conditions to avoid high river flows and related damage; limit period of in-stream disturbance from excavation and backfilling; control erosion and sedimentation from onshore areas by restoring banks to natural contours and gradient with top fill of native select material; do not stockpile excavation spoil in water; avoid trench dewatering directly into flowing waters; avoid spills of petroleum products and other chemicals; remove concrete and other demolition wastes (transport and dispose off concrete waste to inert material landfill, or crash for reuse, if feasible); construct temporary diversions and channels; place bank protection foundations below estimated scour as per drawings. Work in the riverbed will be scheduled on the front end so that it is completed prior to the high flow. If required, an evacuation plan will be prepared and submitted for approval well in advance of the expected high water period. Sedimentation basin will be installed. Hay bale filters will be installed where required (at the outlet is mandatory). The time between excavating and backfilling will be reduced as much as possible (no delays with concrete works permitted). Equipment inspection for any leakage. The water turbidity will be monitored visually and documented with photographic images on a daily basis (observation points: upstream 100 meters of the work area, outlet of sedimentation basin, 100 meters downstream of work area), during pumping operations outlet will be continuously monitored (see below erosion, sedimentation, spill contamination, waste disposal.)	Continuous monitoring during construction and as-built survey.	Contractor MDF/Tt MOE and Ministry of Regional Development and Infrastructure (MRDI), including its department(s) in charge of municipal, bridge and river bank engineering and public works supervision	Continuous monitoring with final inspection

Activities	Impacts	Site Specific Mitigation Measures	Monitoring Action	Implementation	Timing
				Supervision	
				Regulation	
ENVIRONMENTAL					
Excavation, backfilling.  Construction activities.	Disturbance of domestic animals and wildlife (if any)	Maintain activities within approved site boundaries and access; prohibit disturbing and taking domestic animals and wildlife if encountered in project area. Arrange safety tape to isolate trenches from domestic animals. Training of personnel to be aware of animal care.	Monitoring during construction, stop any use of unauthorized areas and harassment of wildlife in area.	Contractor MDF/Tt MOE, MRDI	Continuous monitoring during initial works site preparation and establishing access, weekly surveillance as needed during construction.
Excavations and channels in the river bank.	Potential erosion and sedimentation caused by construction activities	Grade banks of the river and excavations to a stable configuration; avoid or minimize off-site erosion and sedimentation through the use of sediment barriers and traps; install temporary equipment crossing (such as temporary fill and culverts) for active flow portion of channel; complete permanent bank restoration and revegetation of disturbed onshore area and other erosion and reinstatement work. As soon as backfilling is finished, the riverbed and banks will be as promptly as possible returned to the initial condition. All existing concrete blocks and other wastes as well as all temporary pipes will be dismantled, removed and disposed of before completion of works.	Inspect construction activities to supervise implementation of best practices for erosion and sediment control, especially prior to and during storm events. Prepare to remove equipment and material from the river back to staging area in event of high flows (less likely in summer and fall).	Contractor MDF/Tt MOE, MRDI	Daily or several times per week, prioritize before, during and immediately following storm runoff, inspect and supervise during restoration.
Bank protection works	Potential triggering of further bank instability	Additionally to above, check the bank of the river for further signs of sloughing or slumping, restore and armor the banks for permanent control of hydraulic erosion in conjunction with design. Install bank reinforcement with well-graded compact body of concrete and/or riprap for bank erosion defense in accordance with approved designs, latter lined with specified geotextile. Minimize visual impact of riverbank reinforcement.	Perform visual inspection of banks and excavations instability, complete reinstatement on banks.	Contractor MDF/Tt MOE, MRDI	Before beginning of construction and during construction (daily) and after any storm events. MDF to inspect the site after high runoff events in the defects liability period and request additional bank armoring and repair/redesign of revetments as necessary.

Activities	Impacts	Site Specific Mitigation Measures	Monitoring Action	Implementation	Timing
				Supervision	
				Regulation	
ENVIRONMENTAL					
Access road construction and preparation of temporary facilities	Damage caused by temporary access roads and staging areas	Identify access route(s) via the motorway and the staging area, emphasizing safety; provide warning signs and other traffic controls; repair existing roads as necessary following construction. Improve storm water management on the access roads to prevent uncontrolled erosion and drainage. Locating the staging area above the bank of the river or another upland site would be preferable to locating staging area within the river channel. Restore new temporary access route and staging areas following construction. Proper signage installation and final return of the area to the initial or better condition. Installation of plume pipes where necessary or as requested. No shoofly and no damage to third parties. No accumulation of stagnant water on access roads.	Continuous monitoring	Contractor	Completion of Contractor Access Road and Risk Assessment prior to construction.  Continuous during construction, final inspection on completion of restoration work.
				MDF/Tt in coordination with local officials	
				Local authorities (Municipality), traffic management authorities	
Equipment refueling & maintenance  Machinery movement: ✓ across the river bank. ✓ in the riverbed	Contamination from spills	Exercise controls for inspecting equipment and refueling, and implement requirements of the Pollution Prevention and Control Plan (PPCP) in the event of spills. (The PPCP describes measures to be implemented by the construction Contractor to prevent, and if necessary, contain and control the inadvertent spill of hazardous materials such as fuels, lubricants, and solvents using sorbent pads, oil booms, and/or other measures.) In particular, inspect equipment to be used in the river channel and the active floodplain and repair any leaks, such as to hydraulic fluid lines and pumps; and do not refuel vehicles in river channel area. Install secondary containment for any temporary fuel storage tanks in staging areas. Refuel as much as is practical in the yard. All fuel bowsers to carry an adequate spill kit with environmental equipment. Refueling only to be carried out by designated person. Refueling not to take place within 50 meters of a watercourse. Plant maintenance system of regular checks (rather than fixing when broken). Carry out plant maintenance in yard as far as possible. Extreme care in use of hydraulic oils in sensitive (or water) areas. Adequate supply of spill kits with environmental equipment on fuel tanks. Designated personnel only. All machinery will be in good condition, and inspected by environmental officer regularly (using checklist). All equipment fuel operated to be safely deployed with well arranged and maintained secondary containment.	Inspect during construction and monitor PPCP implementation	Contractor (in addition to MDF supervisors). Spill prevention is a common responsibility of all workers.	Continuous monitoring and inspection throughout construction.
				MDF/Tt	
				MOE	

Activities	Impacts	Site Specific Mitigation Measures	Monitoring Action	Implementation	Timing
				Supervision	
				Regulation	
ENVIRONMENTAL					
Equipment and vehicle movement	Air pollution	Regularly spray water on disturbed areas with exposed soils to control blowing dust on access roads in vicinity of local villages. Use vehicles that comply with air pollution standards. Maintain and operate equipment in accordance with manufacturer’s specifications. Regular plant inspection and maintenance.	Visually monitor dust levels.  Check vehicle maintenance records.	Contractor & MDF	Continuous visual monitoring during construction, prioritize dust monitoring during dry, windy weather.  Initial vehicle maintenance check.
				MDF/Tt	
				MOE	
Machinery movement. Noisy construction activities (generators etc.)	Noise	Maintain and operate equipment in accordance with manufacturer’s specifications, provide hearing protection as needed to heavy equipment operators, limit construction to daytime hours. Regular plant inspection and maintenance.	Check vehicle maintenance records.  Monitor during construction.	Contractor	Initial vehicle maintenance check.  Continuous monitoring of hearing protection.
				MDF/Tt	
				MOE	
Waste disposal	Contamination from inappropriate waste disposal	Implement for solid and hazardous wastes the prior developed and agreed Waste Management Plan to minimize and handle waste. In particular remove and dispose solid waste from the river including concrete wastes and excess excavated material not used as backfill or for recontouring. Dispose all accumulated waste from the site prior to any construction activities (Client approval required); install signs and physical barriers (such as ripraps) blocking further disposal. Waste segregation area will be arranged. Hazardous waste stored in safe, designated areas with isolating shelters, located away from watercourses and will use drains tanks with secondary containment. Submit third party waste disposal agreements and documentation (waste transfer notes in format required by MDF). Staging area will be completely dismantled and removed from the site.	Check that the waste is disposed of in accordance with the prior agreed Waste Management Plan.	Contractor	Continuous monitoring and inspection throughout construction.
				MDF/Tt	
				MOE, MRDI	
Engineering structures such as bridges and bank protection	Permanent visual impact	Transplant variety of local seedlings of shrubs and trees on both banks along the entire length of the river (including steeper slopes) to minimize long term visual impact. Put soil over the upper parts of the rip-raps, gabions or similar bank protection structures and seed grasses and implement other mitigation measures to minimize visual impact.	Visual inspection of site revegetation and reinstatement.	Contractor	Continuous during reinstatement phase and final inspection on completion of restoration work.
				MDF/Tt	
				MOE, MRDI	

Activities	Impacts	Site Specific Mitigation Measures	Monitoring Action	Implementation	Timing
				Supervision	
				Regulation	
ENVIRONMENTAL					
Design and construction of bridges and other structures across Dushetiskhevi R.	Intercepting fish migration routes	In order to mitigate fish migration blockage due to bridges or other barriers across the Dushetiskhevi River, these structures will be designed and riverbed recontoured in such a manner to allow fish to migrate along the riverbed. The works should ultimately result in the riverbed contours and flow conditions favorable for the passage of at least the following fish species: <i>Salmo fario</i> , <i>Gobio persa Gunther</i> , <i>Varicorhinus capoeta</i> , <i>Barbus mursa</i> , <i>Barbus lacerta curi Filippi</i> , etc. (with velocities ranging from 1.0÷1.2 m/sec for <i>Salmo fario</i> to 0.3÷0.5 m/sec for other species).	Prior agreement on riverbed arrangement work plan before proceeding with works.	Contractor (works to be organized by the experiences hydro-technical specialist)	Continuous during riverbed works and final checking upon completion. Municipality to organize seasonal monitoring of fish resources during two years after taking over the site.
			Monitoring and supervision during the construction.	MDF/Tt (supervision with assistance of the own hydro-technical engineer)	
			Approval of the as-built drawings after completion of physical works.	MOE, MRDI	
EHS in planning, design and construction supervision	Environmental impacts and performance could suffer if bid documents and contracts do not include mitigation measures with budgets to implement	Include SS ECP in the engineering and works tender and contract as part of the technical specification Provide in the bidding document environmental criteria for contractor staffing and earlier company experience Include quantifiable items from SS ECP into the Bill of Quantities Provide means to supervise and monitor performance of engineering design and constructing contracts Provide mechanism of penalties for EHS misperformance	Providing provisions for Environment, Health & Safety (EHS) in project design & technical specifications, bid documents and contracts	Contractor/MDF	Included in design, specifications, bidding document and contracts. Compliance monitored during implementation, handover, defects liability period.
				MDF/Tt	
				USAID, GoG	



Activities	Impacts	Site Specific Mitigation Measures	Monitoring Action	Implementation	Timing
				Supervision	
				Regulation	
SOCIAL					
Access road construction and temporarily facility preparation	Temporary land use	Consult with local people. Erect temporary fencing to protect livestock where necessary. If more than 10 percent of any land user’s land is permanently taken, conduct a socioeconomic survey and develop income restoration measures for land users. Assure that Contractor’s actions are consistent with resettlement best practices. No shoofly and no damage to third party or unapproved land. No accumulation of stagnant water on access roads. An A0 size signboard will be erected informing the locals on project activities in non technical terms (style and contents to be agreed with Client). The importance of the project will be communicated to the population to explain that the project execution will improve their safety as the construction will rehabilitate unsafe condition. Local government will be informed if any changes are made in the project arrangements.	Ensure that Contractor implements best practice of resettlement, if required.  Monitor during and after construction with contractor making appropriate compensation.	Contractor & MDF	Prior to beginning use of work areas.  Meetings with local authorities and affected community representatives before, during and after construction.
				MDF/Tt	
				Land registry, MRDI	
Daily machinery movement, material transportation etc.	Increased traffic on local roads	The Contractor should consider existing traffic volumes and traffic flows, and take traffic conditions into account when choosing the location of the access road for the staging area. The Contractor should complete an assessment of access road conditions, make necessary safety improvements, and provide traffic control. The Contractor and MDF to coordinate with the local community. Provide repairs as needed to access roads. Low level of noise generation, especially in settlement areas, to avoid any conflicts with the local population. Clear approved access roads with local authorities.	Regular inspections to ensure that the Contractor fulfils the conditions of the plan. Contractor and MDF to coordinate with community.	Contractor and MDF	Prior to mobilizing for construction and weekly during construction.
				MDF/Tt	
				Local authorities (Municipality)	
Construction activities near the populated area.	Influx of workers and increased demands on local infrastructure	The Contractor is to complete plans for temporary housing and the acquisition of local goods and services and for temporary hiring of local workers. The Contractor is to liaise with residents in local villages as necessary to monitor socioeconomic impacts and make adjustments where necessary. In the event of any problems, the community liaison officer will be informed and all measures will be taken to prevent conflicts with the local population.	Regular inspections to ensure that the Contractor fulfils the conditions of the plan. Provide local notice prior to construction. Consultation with locals on a weekly basis.	Contractor and MDF	Prior to mobilizing for construction and weekly during construction.  Weekly meetings with residents.
				MDF/Tt	
				Local authorities (Municipality, Council/Sakrebulo)	
Construction activities near the populated area.	Worker and public health and safety	Provide orientation, safety equipment, periodic toolbox safety briefings, and implement Health and Safety Plans and Procedures. Provide security to prevent unauthorized access to the site. Prepare a plan to evacuate workers, equipment, and material from river in the event of a storm runoff event. Proper signage to be provided where needed. Population will be informed in any case of work execution which will have an influence on their usual activities.	Continuous monitoring with toolbox refresher training.	Contractor	Continuous monitoring during construction.
				MDF/Tt	
				Health Authorities (Central, Municipal)	

## ATTACHMENT J.1.2

***Site-specific Environmental Monitoring Plan – REHABILITATION of Flood Protection***

<b>Monitoring Indicator(s)</b>	<b>Monitoring and Reporting Frequency</b>	<b>Responsible Party(ies)</b> <i>Note: Implementation (I), Monitoring (M), Reporting (R)</i>	<b>Records Generated</b> <i>Note: design/construction company (DC/CC), MDF (MDF), TetraTech (Tt)</i>
Design documentation and plans on construction crews and camp facilities	<ul style="list-style-type: none"> <li>• Review and approval of technical specifications</li> </ul>	<ul style="list-style-type: none"> <li>• Design company (I)</li> <li>• MDF (R) (M)</li> <li>• TetraTech (M)</li> </ul>	<ul style="list-style-type: none"> <li>• Included in drawings and tech. specifications (DC)</li> <li>• Included in bidding documentation (MDF)</li> <li>• Review and clearance (Tt)</li> </ul>
Environmental compliance at camps & staging areas	<ul style="list-style-type: none"> <li>• Inspected on mobilization and continuously throughout the project</li> </ul>	<ul style="list-style-type: none"> <li>• Construction contractor (I) (R)</li> <li>• MDF (M) (R)</li> <li>• TetraTech (M)</li> </ul>	<ul style="list-style-type: none"> <li>• Weekly reports (CC)</li> <li>• Monitoring using camp and staging area checklists, reporting violations (MDF)</li> <li>• Review of reports (Tt)</li> </ul>
Health screening of workforce and monitoring local population	<ul style="list-style-type: none"> <li>• On hiring and random screening of suspected personnel and workforce</li> <li>• Continuous monitoring</li> <li>• Weekly toolbox talks</li> </ul>	<ul style="list-style-type: none"> <li>• Construction contractor (I) (R)</li> <li>• MDF (M) (R)</li> <li>• TetraTech (M)</li> </ul>	<ul style="list-style-type: none"> <li>• Medical screening records (CC)</li> <li>• Toolbox talk records (CC)</li> <li>• Monitoring records (MDF)</li> <li>• Interviews with locals (Tt)</li> </ul>
Detecting signs of killed flora and fauna at work sites	<ul style="list-style-type: none"> <li>• Continuous monitoring on sites and immediately reporting all violations</li> </ul>	<ul style="list-style-type: none"> <li>• Construction contractor (I) (R) (M)</li> <li>• MDF (M) (R)</li> <li>• TetraTech (M)</li> </ul>	<ul style="list-style-type: none"> <li>• Immediately reporting violations (CC)</li> <li>• Reporting any signs of killed wildlife or damage to vegetation off-site (MDF)</li> <li>• Interviews with workforce and locals (Tt)</li> </ul>
Minimizing use and impacts from heavy equipment (erosion, compaction, pollution, etc.) through <ul style="list-style-type: none"> <li>• Design documentation review</li> <li>• Inspection on mobilization</li> <li>• Continuous on site inspections</li> </ul>	<ul style="list-style-type: none"> <li>• Review and approval of technical specifications</li> <li>• Inspection of heavy equipment before and on mobilization</li> <li>• Continuous monitoring throughout the project</li> <li>• Initial and biannual review of equipment and vehicle maintenance protocols and records</li> </ul>	<ul style="list-style-type: none"> <li>• Design company (R)</li> <li>• Construction contractor (I) (R) (M)</li> <li>• MDF (M) (R)</li> <li>• TetraTech (M)</li> </ul>	<ul style="list-style-type: none"> <li>• Included in drawings, technical specifications and bid list of equipment (DC)</li> <li>• Included in bidding documentation (MDF)</li> <li>• Review and clearance of bidding documentation (Tt)</li> <li>• Equipment maintenance protocols and records (CC)</li> <li>• Weekly reports (CC)</li> <li>• Monitoring using heavy equipment inspection checklist and refueling equipment inspection checklist, reporting all violations (MDF)</li> <li>• Reporting on maintenance protocol records and contractor performance (MDF)</li> <li>• Review and monitoring of reports, field checks (Tt)</li> </ul>

Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsible Party(ies) <i>Note: Implementation (I), Monitoring (M), Reporting (R)</i>	Records Generated <i>Note: design/construction company (DC/CC), MDF (MDF), TetraTech (Tt)</i>
<p>Sourcing of building and logging materials, aggregates through</p> <ul style="list-style-type: none"> <li>Borrow sites identification at design stage</li> <li>Import only from permitted/licensed extraction sites</li> <li>Reviewing borrow site documentation</li> <li>Clearing site selection</li> <li>Approval of logging , quarrying and borrowing plans</li> <li>Approval of borrow site environmental management plan</li> </ul>	<ul style="list-style-type: none"> <li>Suggested list of sources included in the design and specifications</li> <li>Monitoring source document prior to extraction and delivery to the construction site</li> <li>Prior approval of borrow sites proposed by contractor</li> <li>Prior approval of borrow site environmental management plan</li> <li>Initial and final inspection of borrow sites and quarries</li> </ul>	<ul style="list-style-type: none"> <li>Design company (R)</li> <li>Construction contractor (I) (M)</li> <li>Operator of borrow sites (I) (M)</li> <li>MDF (R) (M)</li> <li>TetraTech (M)</li> </ul>	<ul style="list-style-type: none"> <li>Borrow sites identification at design stage (DC)</li> <li>Material only from permitted/licensed sources (CC)</li> <li>Monitoring borrow site documentation (MDF)</li> <li>Initial inspection of each source of material (MDF)</li> <li>Clearance of selected borrow sites, field checks (MDF, Tt)</li> <li>Final inspection of borrow sites, observing run-offs and stagnant waters (MDF)</li> </ul>
<p>Minimizing use of hazardous and non-hazardous materials through</p> <ul style="list-style-type: none"> <li>Review of contractor's waste management plan</li> <li>Waste disposal monitoring throughout the project</li> <li>Checking waste transfer notes</li> <li>Incident reports</li> </ul>	<ul style="list-style-type: none"> <li>Initial review and approval of contractor's waste management plan (including anticipated non-hazardous and hazardous waste inventory) prior to site mobilization</li> <li>Continuous monitoring throughout the project</li> <li>Contractor keeping all waste transfer notes and the periodic external checking of records</li> </ul>	<ul style="list-style-type: none"> <li>Design company (R)</li> <li>Construction contractor (I) (R) (M)</li> <li>MDF (M) (R)</li> <li>TetraTech (M)</li> </ul>	<ul style="list-style-type: none"> <li>Including non- and hazardous waste management provisions in the technical specifications and in the bill of quantities (DC, MDF)</li> <li>Review and clearance of bidding document (Tt)</li> <li>Review and clearance of contractor's waste management plan (MDF &amp; Tt)</li> <li>Hazardous and non-hazardous waste transfer and disposal records (CC)</li> <li>Weekly reports (CC)</li> <li>Incident reports (CC)</li> <li>Monitoring using camp and staging area checklists; hazardous and non-hazardous waste collection inspection checklists, reporting all violations (MDF)</li> <li>Reporting on waste transfer records and contractor performance (MDF)</li> <li>Approval of hazardous waste disposal site selection by contractor (Tt)</li> <li>Review and monitoring of reports, field checks (Tt)</li> <li>Corrective and preventive actions requests (MDF, Tt)</li> </ul>

Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsible Party(ies) <i>Note: Implementation (I), Monitoring (M), Reporting (R)</i>	Records Generated <i>Note: design/construction company (DC/CC), MDF (MDF), TetraTech (Tt)</i>
Monitoring and minimizing site clearance, leveling, excavations, filling, applying erosion control and site restoration though <ul style="list-style-type: none"> <li>Design documentation review</li> <li>Review and approval of method statements</li> <li>Site inspections</li> </ul>	<ul style="list-style-type: none"> <li>Initial review and approval of technical specifications</li> <li>Approval of contractor's method statements before proceed order</li> <li>Continuous field monitoring</li> <li>Final inspections</li> </ul>	<ul style="list-style-type: none"> <li>Design company (R)</li> <li>Construction contractor (I) (M)</li> <li>MDF (R) (M)</li> <li>TetraTech (M)</li> </ul>	<ul style="list-style-type: none"> <li>Erosion control and site restoration plans included in technical specifications and bidding documents (DC and MDF)</li> <li>Erosion control and restoration method statements (CC)</li> <li>On site monitoring (priority after heavy rain events) and final inspection (MDF)</li> <li>Review and clearance of erosion control and site restoration plans and method statements, field checks (Tt)</li> </ul>
<ul style="list-style-type: none"> <li>Health and Safety Plan (HS Plan)</li> <li>Emergency Response Plan</li> <li>Pollution Prevention and Control Plan</li> </ul>	<ul style="list-style-type: none"> <li>Clearance prior to mobilization</li> <li>Continuous on site monitoring</li> <li>Incident reporting</li> </ul>	<ul style="list-style-type: none"> <li>Design company (R)</li> <li>Construction contractor (I) (M)</li> <li>MDF (R) (M)</li> <li>TetraTech (M)</li> </ul>	<ul style="list-style-type: none"> <li>HS requirements (DC)</li> <li>Design features for emergencies in case of systems failure (DC)</li> <li>HS Plan and submit for approval (CC)</li> <li>Incident reports (CC)</li> <li>Continuous inspection reports (MDF)</li> <li>Review and approval of plans, performance monitoring and periodic field checks (Tt)</li> </ul>
Traffic control for construction phase	<ul style="list-style-type: none"> <li>Traffic control plan and signage clearance prior to mobilization</li> <li>Continuous monitoring and incident reporting during construction</li> <li>Dust and emissions control plan</li> </ul>	<ul style="list-style-type: none"> <li>Design company (R)</li> <li>Construction contractor (I) (M)</li> <li>MDF (R) (M)</li> <li>TetraTech (M)</li> <li>MRDI, and Traffic Police (approvals, deployment)</li> </ul>	<ul style="list-style-type: none"> <li>Traffic control plan for construction phase (DC)</li> <li>Construction planning and phasing, proper signage (CC)</li> <li>MRDI (approval)</li> <li>Deployment of proper traffic controls (Traffic Police)</li> </ul>
Providing EHS provisions in <ul style="list-style-type: none"> <li>Design &amp; Technical Specifications</li> <li>Bidding documentation</li> <li>Contract documentation</li> </ul>	Prepare, review and approve <ul style="list-style-type: none"> <li>Design &amp; Technical Specifications</li> <li>Bidding documentation</li> <li>Contract documentation</li> </ul>	<ul style="list-style-type: none"> <li>Design company (R)</li> <li>Construction contractor (I) (M)</li> <li>MDF (R) (M)</li> <li>TetraTech (M)</li> </ul>	EHS provisions included in <ul style="list-style-type: none"> <li>ToR, Design &amp; Technical Specifications (DC, MDF)</li> <li>Bidding documentation (MDF)</li> <li>Contracts (MDF)</li> <li>Weekly reports (CC)</li> <li>Inspection at mobilization and continuously (MDF)</li> <li>Review, approval and performance monitoring at all stages (Tt)</li> </ul>

## ATTACHMENT J.2.1

Site-specific Environmental Mitigation Plan – *OPERATION of Dushetiskhevi Flood Protection*

Activity	Identified Environmental Impacts	Mitigation Measure(s)	Monitoring Indicator(s)
<b>Monitoring and repairs of bridges and river bank protection structures</b>	<ul style="list-style-type: none"> <li>• Damage to engineering structures in and along the riverbed which may lead to bridge failure and social impacts</li> <li>• Bank instabilities and risk of bank erosion, impacting local properties</li> <li>• Blockage of water and sediment flow by debris, accumulation of sediments and consequent risk of local flooding and damage to bridges</li> </ul>	<ul style="list-style-type: none"> <li>• Geotechnical engineers commissioned by local authorities to annually inspect and monitor bank protection structures and bridges detecting any signs of damage and failure.</li> <li>• Maintain bank protection structures by timely repairs and maintenance. This is particularly helpful in case of soft engineering structures (rip/raps, gabions).</li> <li>• Removal of trees and other debris obscuring the water and sediment flow.</li> </ul>	<ul style="list-style-type: none"> <li>• Periodic inspection and maintenance of all structures in the riverbed</li> </ul>
<b>Construction camp and crew, use of maintenance of equipment, etc.</b>	(See respective environmental mitigation plan provisions for rehabilitation phase)		
<b>Development control in and along riverbed Dushetiskhevi</b>	<ul style="list-style-type: none"> <li>• Increased exposure to flood risks due further development in the high risk areas</li> <li>• Hydraulic impacts due to encroachment into the riverbed and active floodplain areas</li> </ul>	<ul style="list-style-type: none"> <li>• Setback zones delineated and regulated.</li> <li>• Gradual and long term equitable resettlement planning process initiated and implemented for flood risk areas.</li> </ul>	<ul style="list-style-type: none"> <li>• Setback zones delineated, approved and enforced</li> <li>• Long term Resettlement Plan for flood risk and active floodplain areas developed, approved and enforced</li> </ul>
<b>Activates in the watershed of Dushetiskhevi</b>	<ul style="list-style-type: none"> <li>• Increased flood risks due to deforestation and other inadequate practices in the entire catchment</li> <li>• Pollution coming from the watershed and Dusheti</li> </ul>	<ul style="list-style-type: none"> <li>• Watershed management plan developed, approved and integrated set of measures implemented.</li> </ul>	<ul style="list-style-type: none"> <li>• Watershed Management Plan developed, approved and enforced</li> </ul>



## ATTACHMENT J.2.2

Site-specific Environmental Monitoring Plan – *OPERATION of Flood Protection in Dusheti*

Monitoring Indicator(s)	Monitoring and Reporting Frequency	Responsible Party(ies) <i>Note: Implementation (I), Monitoring (M), Approval (A), Reporting (R)</i>	Records Generated <i>Note: Local Authority (LA), Ministry of Regional Development and Infrastructure (MRDI), MDF(MDF), TetraTech (Tt)</i>
Periodic inspection and maintenance of bridges	• Annual	<ul style="list-style-type: none"> <li>• Municipality (I) (R)</li> <li>• MRDI (M)</li> <li>• TetraTech (drafting O&amp;M manual)</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory and maintenance schedules (LA)</li> <li>• O&amp;M manual (Tt)</li> </ul>
Periodic inspection and maintenance of river bank protection structures	• Seasonal	<ul style="list-style-type: none"> <li>• Municipality (I) (R)</li> <li>• MRDI (M)</li> <li>• TetraTech (drafting O&amp;M manual)</li> </ul>	<ul style="list-style-type: none"> <li>• Inventory and maintenance schedules (LA)</li> <li>• O&amp;M manual (Tt)</li> </ul>
(See respective environmental monitoring plan provisions for rehabilitation phase)			
• Setback zones delineated, approved and enforced	<ul style="list-style-type: none"> <li>• 10 years, with revision every 5 years</li> <li>• Continuous monitoring and reporting</li> </ul>	<ul style="list-style-type: none"> <li>• Local Municipality (I) (R)</li> <li>• Local Sakrebulo (A)</li> <li>• MRDI and MoE (M)</li> <li>• TetraTech (Drafting)</li> </ul>	• Setback zones delineated, approved and enforced (LA)
Resettlement Plan for Dushetiskhevi River Floodplain developed, approved and enforced	<ul style="list-style-type: none"> <li>• 10 years, with revision every 5 years</li> <li>• Continuous monitoring and reporting</li> </ul>	<ul style="list-style-type: none"> <li>• Local Municipality (I) (R)</li> <li>• Local Sakrebulo (A)</li> <li>• MRDI and MoE (M)</li> <li>• Donor community (support with funding and expertise)</li> </ul>	• Resettlement Plan for Dushetiskhevi River Floodplain developed, approved and enforced (LA)
Watershed Management Plan for Dushetiskhevi River developed, approved and enforced	<ul style="list-style-type: none"> <li>• 10 years, with revision every 5 years</li> <li>• Continuous monitoring and reporting</li> </ul>	<ul style="list-style-type: none"> <li>• Local Municipality (I) (R)</li> <li>• Local Sakrebulo (A)</li> <li>• MRDI and MoE (M)</li> <li>• Donor community (support with funding and expertise)</li> </ul>	• Watershed Management Plan for Dushetiskhevi River developed, approved and enforced (LA)

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